

# Bedside Conventional Tracheostomy in ICU: A Multicenter Experience from Bangladesh

SM Khorshed Alam Mazumder<sup>1</sup>, Md Shamsul Alam<sup>2</sup>, Md Daulatuzzaman<sup>3</sup>, Md Ashfaquzzaman Sikder<sup>4</sup>, Md Tahsin Salam<sup>5</sup>, Alfatun Akter Jahan<sup>6</sup>

## Abstract

*Tracheostomy is one of the most frequent procedures performed in intensive care unit (ICU) patients. It has many advantages like patient's comfort, early movement from the ICU, and shorter ICU and hospital stay. Of the various techniques, we practice bedside open procedure tracheostomy for ICU patients considering the safety and cost effectiveness.*

**Aim:** To observe the common indications and timing of tracheostomy in our circumstances.

**Method:** This cross-sectional study was carried out in 11 ICUs of Dhaka city from January 2008 to June 2015. All ICU patients, irrespective of age and sex, whose tracheostomy were done after admission in ICU at bedside by the principal author with associates were included in this study.

**Result:** Bedside conventional tracheostomy was done in 345 ICU patients during the study period. Among them, 65% were male and 35% were female. Mean age of the patients was 44.30. Common indications for tracheostomy were cerebro-vascular disease (36%), laryngeal oedema (20%), advanced malignancy (16%), and trauma (12%). Only 54 patients had complications like hemorrhage (6%), surgical emphysema (3%), tube displacement (3%), wound infection (2%) and pneumothorax (1%).

**Conclusion:** Bedside conventional tracheostomy is safe and efficient with low morbidity. Mortality is not worse and may be improved with earlier provision, especially in head-injured and critically ill medical patients. The timing of tracheostomy continues to be individualized, and should include daily weaning assessment, and can generally be made within 7 days of endotracheal intubation.

**Key words:** tracheostomy, endotracheal intubation, intensive care unit

## Introduction:

Tracheostomy, the deliberate creation of a stoma at the skin surface of anterior neck which leads into the trachea<sup>1</sup>, is one of the most frequently performed surgical procedures in intensive care unit (ICU) patients.<sup>1</sup> As many as 10% of patients requiring at least 3 days of mechanical ventilation will eventually receive a tracheostomy for prolonged

mechanical ventilation or airway support. While prolonged respiratory failure is probably the most common reason for performing tracheostomy.<sup>2</sup> Tracheostomy was performed in ancient times & the recoding of such events have been documented by Asclepiades, the Greek Physician in 100 BC<sup>3</sup>. It is performed in about 24% of all patients in intensive care units.<sup>3,4</sup> Tracheostomy has several advantages over endotracheal intubation including reduced airway resistances, and hence decreased work of breathing, which may allow early extubation, smaller dead spaces, less movement of the tube within the trachea, allowing the patient to speak and to eat, greater comfort and makes nursing care easier, especially with respect for suctioning.

Moreover long-term intubation has a lot of disadvantages such as the need for adequate patient sedation in order to tolerate the tube, the possibility of accidental extubation or misplacement into main bronchus, laryngeal damage, which can be very serious and tracheal stenosis may rarely occur<sup>5</sup>. Indication for Tracheostomy are mainly weaning failure from assisted ventilation, acute or chronic neuromuscular conditions, poor cardio-respiratory reserve, bulbar dysfunction, brain injury, upper airway obstruction etc<sup>6</sup>. Patients experience discomfort with persistent translaryngeal intubation and are more comfortable following tracheostomy. It was suggested that if the anticipated need for mechanical ventilation is longer than 21 days than tracheostomy is preferable. For mechanical ventilation that is anticipated to last between 10 and 21 days, the decision was left to the

1. Dr. S M Khorshed Alam Mazumder, Professor & Head of Department of Otolaryngology and Head-Neck Surgery, Holy Family Red Crescent Medical College & Hospital (HFCMCH), Dhaka
2. Dr. Md Shamsul Alam, Associate Professor Anesthesiology Department, HFCMCH, Dhaka
3. Dr. Md Daulatuzzaman, Professor of Otolaryngology and Head-Neck Surgery, HFCMCH, Dhaka
4. Dr. Md Ashfaquzzaman Sikder, Associate Professor of Otolaryngology and Head-Neck Surgery, HFCMCH, Dhaka
5. Dr. Md Tahsin Salam, Medical Officer, ICU, Ibn sina Hospital
6. Dr. Alfatun Akter Jahan, Medical officer, ICU, Anwer Khan Medical College Hospital

## Corresponding Author:

Dr. S M Khorshed Alam Mazumder  
Professor & Head  
Department of Otolaryngology and Head-Neck Surgery  
Holy Family Red Crescent Medical College & Hospital (HFCMCH),  
Dhaka

physician, and daily assessment was recommended.<sup>6</sup> Although recent studies have suggested that tracheostomy can be a safe procedure in the ICU. Though tracheostomy has also been found to lead to life-threatening complications like hypoxia, cardiac arrest, injury to structures immediately adjacent to the trachea, wound infection, surgical emphysema, pneumothorax and haemothorax.<sup>7</sup> Many critically ill patients' families have been hesitant in authorizing tracheostomy because of cosmetic issues and speech problems.<sup>7,8</sup> In the recent years more and more airway problems are managed with endotracheal intubation or percutaneous endoscopically guided tracheostomy.<sup>9,12</sup> But in many countries percutaneous endoscopically guided tracheostomy is not yet routinely practiced because of cost effectiveness and skill development. Conventional tracheostomy is practiced in vast majority of cases in ICU.

#### Methods:

This study included all ICU patients, irrespective of age and sex, whose tracheostomy has done after admission in ICUs at bedside by the principal author with associates. This is a cross sectional study carried out from January 2008 to June 2015 in prime & private ICU settings at Dhaka city. The ICUs with Attached Hospitals are: Holy family Red Crescent Medical College Hospital, Anwer Khan Modern Medical College Hospital, Labaid Specialized Hospital, Ibn Sina Hospital, Central Hospital, Somorita Hospital, Ayesha Memorial Hospital. Uttara crescent Hospital, Eden multicare Hospital, Millennium Hospital and Dhanmondi Clinic Hospital. Many of the ICUs are associated with Neonatal ICU. A total of 345 patients whose tracheostomy was done by principal author at bedside had been selected for this study. Data was collected in a prescribed data collection sheet supplied to the ICU doctors of all these ICUs dispersed in prime areas of city. Data included age, sex, address and contact information, socioeconomic conditions & education level, admission date & time, patient's clinical condition at the time of admission and intubation, intubation date & time, patient's primary disease requiring emergency ICU admission, co-morbidities and associated diseases, complications and receptiveness of counseling and attitude of attendances. All data were compiled and analyzed.

#### Results:

Total 345 patients were operated by bedside tracheostomy in last 7 and a half years time. Although most of the patients were presented with critical illness with a diagnosis, had associated comorbidities like uncontrolled or poorly controlled diabetes mellitus, hypertension, cardiovascular diseases, bronchial asthma, chronic renal disease, advanced malignancy, and senility. Considerable numbers of patients were postsurgical. Common indications were cerebrovascular

disease (36%) of which 6% are postsurgical-intracranial tumour or hematomas; laryngeal oedema due to systemic illness (20%), advanced malignancy (16%); road traffic accidents causing head injury, maxillofacial injury, laryngotracheal injury (12%), Respiratory failure and COPD (8%), Guillain Berre Syndrome (6%), terminal care (2%). Tracheostomy was done from 2nd day of intubation to 21st day of admission and 95% patients were intubated during the operation.

**Table-I :** Age distribution of the subject (n=345)

Age in years	Numbers	Percentage
0-10	2	.5%
11-20	5	1.5%
21-30	30	9%
31-40	56	16%
41-50	98	28%
51-60	64	19%
61-70	52	15%
71-80	38	11%

Table I is showing distribution of the age where the lowest age was 8 years and the highest was 79 years. Numbers of patients in 5th & 6th decades were highest

**Table-II :** Sex distribution of the subject (n=345)

Sex	Numbers	percentage
Male	224	65%
Female	121	35%

Among the 345 patients 224 were male (65%) and 121 were female (35%). Male to female ratio was 1.85:1

**Table-III :** Distribution of socio-economic condition (n=345)

Socio-economic status	Numbers	Percentage
Low	80	23%
Middle class	155	45%
Affluent	110	32%

Table-III is showing distribution of the socioeconomic condition of the subjects. Among the 345 patients middle class group was seen to be the commonest group scoring to 155 (45%).

**Table IV :** Distribution of resident (n=40)

Residential area	Numbers	Percentage
Rural	52	15%
Urban	293	85%

Table IV is showing out of 345 cases, most were residing in urban area.

**Table-V :** Indications of tracheostomy (n=345)

Indications	Numbers	Percentage
Cerebrovascular disease	124	36%
Laryngeal oedema due to systemic illness	69	20%
Advanced malignancy Laryngotracheal and Maxillofacial injury	55	16%
Head injury RTA* with cervical spinal cord injury	41	12%
Respiratory failure and COPD	28	8%
Guillain Berre Syndrome	21	6%
Terminal care	7	2%

\*RTA = Road Traffic Accident

**Table-VI :** Complications of tracheostomy (n=54)

Complications	Numbers	Percentage
Hemorrhage	21	6%
Surgical emphysema	12	3%
Tube displacement	10	3%
Wound infection	8	2%
Pneumothorax	3	1%

Table V shows the distribution of indication of tracheostomy, and table VI shows the complications of bedside tracheostomy.

**Discussion:**

Tracheostomy is one of the most frequently performed surgical procedures in ICU patients and is recognized as one of the life saving operations, but not always without complications. In this study 345 cases of tracheostomy in the ICUs were studied prospectively to see their various Sociodemographic characters, the indications and timing. The values were compared to some other published reports from country and abroad.

The age range of the subjects varied from 8 years to 79 years. The mean age was found 44.30 years, with highest frequency in the age group 31-50 years. In a previous study in America the mean age was found 48.25 years with highest frequency in the age group 41- 50 years which was similar to this study.<sup>9,11</sup>

Study of sex distribution among the 345 cases of tracheostomy in ICU showed that 224 cases were male and 121 cases were female. Male to female ratio was 1.85:1. In a Latin American study the male to female ratio was found 1.8:1 which was similar to our study.<sup>12</sup>

In this study 45% of the cases came from middle class groups. Second most common group was affluent group (32.5%). In a study in Bangabandhu Sheikh Mujib Medical University (BSMMU) patient were equal from all classes which were not

similar to this study, 8 7.5% cases come from urban area and 12.5% came from rural area.<sup>11</sup> Low percentage of patients coming from rural area may be due to poor infrastructure of health system, lack of awareness and low socioeconomic condition in rural area.

The study revealed that the commonest indication of tracheostomy in the ICU was cerebrovascular disease (36%) followed by laryngeal oedema due to systemic illness (20%), advanced malignancy (16%), traumatic conditions (12%), and Respiratory failure due to COPD (8%). Next common indications were Guillain-Barre syndrome (6%) and Terminal care patients (2%).

In a study in BSMMU and Dhaka Medical College Hospital (DMCH) common indications were head injury with history of Road Traffic Accident (RTA) (26.67%) and Cerebrovascular disease including cerebrovascular accident, post operative case of intra cranial space occupying lesion, followed of Guillain-Barre syndrome (10%).<sup>1,10,11</sup> Head injury with history of RTA was the commonest indication because the incidence of RTA is very high in this country due to overloaded or inroad worthy vehicles, lack of awareness of safe road use, poor traffic management, lack of proper law enforcement and poor driver training.<sup>12</sup> RTA patients outnumber for admitting in ICU settings but patients first attend emergency department of Public Hospitals for cost effective treatment and only who can effort go to private ICU settings.<sup>14</sup>

In this study surgical emphysema was the second commonest complications (3%). In the previous studies surgical emphysema was the commonest complication 5% (3.33%)<sup>10</sup> and (9.47%)<sup>9</sup> which is similar to this study. Surgical emphysema can be alarming but is seldom fatal.<sup>13</sup> It is mostly confined to the neck but can extend to the face and chest wall. It usually presents within the first day and is self-limiting but the seventh day, unless the precipitating factor persists.<sup>13</sup> Too tight closure of the skin or subcutaneous tissue, to large incision in the trachea, improperly fitting tracheostomy tube and excessive coughing are the causative factors.<sup>14</sup> The risk of tracheostomy tube being displaced is increased in cases of marked surgical Emphysema due to local increase in the neck swelling.<sup>2, 13</sup>

Hemorrhage was found intraoperatively in 1.5% cases. In a study in BSMMU, 2nd common complication was hemorrhage (3.33%).<sup>11</sup> Hemorrhage is most commonly arising from anterior jugular veins and thyroid gland Isthmus. Tube displacement was found in 2% cases. In a study in BSMMU it was found in 3.33% & 2.5%.<sup>11</sup>

Length of the tube and thickness and height of the neck are clearly the most important factors; post operative oedema, hematoma and emphysema will cause a broadening of the distance between the skin surface and the anterior wall of the trachea.<sup>2</sup> Although few studies showed incidence of dysphagia, aspiration, tracheo-oesophageal fistula, trachea cutaneous fistula and cardiac arrest, we found no such complications.<sup>10, 11</sup> In this study one mortality was found due to cardiac arrest. The fatality was due to cardiac arrest and

pneumomediastinum and the rate varied from 0% to 5% in a Latin American study.<sup>9</sup> The complications in our cases could be lowered if the logistic supports for tracheostomy are of international standard. But in this study authors performing most of the tracheostomy in underprevililaged situations. The rate of complication of tracheostomy in ICU was 15.6% in this study. In an American study it was (8.7%)<sup>9</sup> and in another study it was 10% which is almost similar to this study.<sup>11</sup>

**Conclusion:**

In this study 345 cases of tracheostomy had been analyzed in ICU of different private ICU set up in Dhaka city. Tracheostomy was a life saving procedure and done for various indications in ICU. It has more benefits over endotracheal intubation. Bedside tracheostomy ensures tracheostomy in time, which facilitates proper treatment and reduced mortality. In this study few complications of tracheostomy were noted. Most of the complications were preventable and could have been avoided by careful operative technique and meticulous post operative management with a standard ICU.

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