

## Original Article

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# Comparative study on complications of emergency and elective tracheostomy

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### Abstract

**Background:** Both elective and emergency tracheostomy as life saving procedure is frequently performed. Tracheostomy can be associated with numerous (per operative and post operative) complications.

**Methods:** this was a cross sectional study 120 patients were studied age ranged from 9 years to 79 years in four different tertiary hospitals in Dhaka from July 2011 to June 2013.

**Results:** Among 120 tracheostomized patients, 75 (62.5%) were patients of emergency tracheostomy group and 45 (37.5%) were patients of elective tracheostomy group. Laryngeal carcinoma and other head-neck malignancy were the common (67.34%) indications for emergency tracheostomy. Maxillofacial and laryngeal surgery (50.1%) was the common indications for elective tracheostomy. Haemorrhage was the most common complication. The second most common complication were subcutaneous surgical emphysema and wound infection, Then tube displacement, pericondritis and stomal stenosis/ granulation tissue formation were the complications. In all stages (peroperative, immediate postoperative, early postoperative and late postoperative), the frequency of complications was more in emergency tracheostomy and it was statistically significant ( $p < 0.05$ ).

**Conclusion:** Complications are more in emergency than elective tracheostomy. To reduce complications should be aim of all types of tracheostomy.

### Introduction

Tracheostomy is a surgical procedure in which creation of a stoma between the skin and the anterior wall of the trachea. It is one of the oldest surgical procedures known<sup>1</sup>.

Due to the advancements of endotracheal intubations procedure in intensive care facilities and the widespread use of mechanical ventilation, this procedure became less indicated in developed countries in recent years, but still it is most commonly performed life saving surgical procedures in cases of

infectious diseases in children, neoplastic and traumatic airways obstruction in adults in our region<sup>2</sup>.

Tracheostomy can be associated with numerous Complication rate ranges from 6 to 66%<sup>3</sup>. The complications following tracheostomy is different based on its types and nature, the condition of the patient, indications of it, place of procedure, management facilities and the experience of the surgeon. Numerous studies demonstrate a greater complication and mortality rate in emergency situations, in severely ill patients, and in small children<sup>4</sup>. Conventionally due to some reasons complications of tracheostomy is more in tracheostomy done as emergency procedure.<sup>5</sup> Emergency tracheostomy carries a two to five fold increase in incidence of complications than an elective procedure.

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Some, of these complications continue to be a problem after placement of the tracheostomy tube, and there are specific late complications that have clinical relevance<sup>6</sup>.

### Methods

**Type of Study:** Cross sectional study

**Place of Study:** Dhaka Medical College Hospital Dhaka, Bangabandhu Sheikh Mujib Medical University, Sir Salimullah Medical College & Mitford Hospital and Shaheed Suhrawardy Medical College Hospital.

**Period of study:** July 2011 to June 2013

**Study population:** Patient who were admitted in these hospitals with respiratory distress due to upper airway obstruction or who need tracheostomy to secure upper airway before or after operation in head neck region.

**Sample size:** 120 patients

**Sampling technique:** Purposive

### Inclusion criteria:

1. Patients coming with respiratory distress due to upper airway obstruction who need tracheostomy.
2. Patient with disease in head neck region who need tracheostomy before or after operation to secure upper airway.
3. Patient agreed to come in periodic follow up (at least 2 weeks).

### Exclusion criteria:

1. Patient with tracheostomy done in different centers
2. Patients stay in these hospital <10 days
3. Patient failed to or disagrees to subsequent follow up

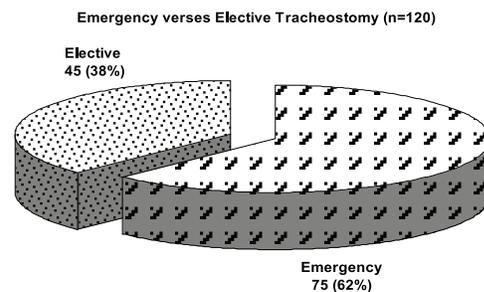
### Data Analysis

Z-test and Chi square test were done for non-parametric data. Hypothesis was tested by Chi square test. All the data compiled analyzed by using SPSS-v-16 soft ware in computer.

### Results

Among 120 tracheostomized patients, 75(62.5%) had underwent emergency tracheostomy and 45 (37.5%) elective tracheostomy.

Among them 89(74.17%) were male and 31(25.83%) were female (M:F= 2.87 :1). Age of the patient ranged from 9 years to 79 years (mean  $48.86 \pm 15.97$ ), sixty four (53.33%) patient habitats in the rural community and fifty one (46.67%) were from poor socioeconomic condition.



**Fig.-2:** Emergency vs elective Tracheostomy

**Table-I**  
*Intraoperative Complication in both types of tracheostomy (n=16)*

Complications	Emergency	%	Elective	%	Total	%
Hemorrhage	6	37.5	2	12.50	8	50
Local tissue injury	3	18.75	1	6.25	4	25
Apnoea	2	12.50	0	0.00	2	12.5
Cardiac arrest	1	6.25	1	6.25	2	12.5
Total	12	75	4	25	16	100

**Table-II***Immediate postoperative Complication (<24 hours) in both the types of tracheostomy (n=22)*

Complications	Emergency	%	Elective	%	Total	%
Hemorrhage	3	13.636	2	9.095	5	22.731
Emphysema	6	27.272	1	4.547	7	31.819
Tube displacement	4	18.181	0	0.00	4	18.181
Tube obstruction	2	9.0905	1	4.547	3	13.636
Pneumothorax	2	9.0905	1	4.547	3	13.636
Total	17	77.264	5	22.736	22	100

**Table-III***Early/intermediate postoperative (24-72hr) Complications in both the types of tracheostomy (n=15)*

Complications	Emergency(n=75)	%	Elective(n=45)	%	Total	%
Bleeding	1	6.666	0	0.00	1	6.666
Infection	2	13.332	1	6.666	3	18.998
Perichondritis	4	26.664	1	6.666	5	32.33
Tracheoesophageal fistula	1	6.666	0	0.00	1	6.666
Pneumothorax	2	13.332	1	6.666	3	18.998
Others	1	6.666	1	6.666	2	13.332
Total	11	73.336	4	26.664	15	100

**Table-IV***Late postoperative (3-7 days) Complications in both the types of tracheostomy (n=24)*

Complications	Emergency(n=75)	%	Elective(n=45)	%	Total	%
Bleeding	1	4.166	1	4.166	2	1.67
Wound Infection	6	24.996	1	4.166	7	5.83
Perichondritis	4	16.664	1	4.166	5	4.17
Granulation tissue	4	16.664	1	4.166	5	4.17
tracheoesophageal fistula	1	4.166	0	0.00	1	0.83
Stenosis	1	4.166	0	0.00	1	0.83
Skin necrosis	2	8.332	0	0.00	2	1.67
Bronchopneumonia	0	0.00	1	4.166	1	0.83
Total	19	79.17	5	20.83	24	100

**Table-V***Complications in different stages in both the types of Tracheostomy (n=77)*

Complications	Emergency(n=75)	%	Elective(n=45)	%	Total	%
Peroperative	12	15.584	4	5.194	16	20.778
Immediate Postoperative	17	22.077	5	6.491	22	28.568
Early Postoperative	11	14.028	4	5.194	15	19.222
Late Postoperative	19	24.675	5	6.491	24	31.116

**Table-VI***Types of different Complications between Emergency and Elective Tracheostomy (n=49)*

Complications	Emergency	%	Elective	%	Total	%
Bleeding	8	16.32	2	4.08	10	20.40
Emphysema	6	12.24	1	2.04	7	14.28
infection	6	12.24	1	2.04	7	14.28
Tube displacement	4	8.16	1	2.04	5	10.20
Tube obstruction	2	4.08	1	2.04	3	6.12
Stenosis/ granulation	4	8.16	1	2.04	5	10.20
Perichondritis	4	8.16	1	2.04	5	10.20
Apnoea	3	6.12	0	0.00	3	6.12
Local tissue injury	3	6.12	1	2.04	4	8.16
Total	40	81.64	9	18.36	49	100

**Table-VII***Distribution of operative complications between Emergency and Elective Tracheostomy (n=120)*

Types	Complication		No complication		Total	
	No	%	No	%	No	%
Emergency	40	53.33	35	46.67	75	62.50
Elective	9	20.00	36	80.00	45	37.50
Total	49	44.00	87	126.67	120	100.00

Chi-square with 1 degrees of freedom. (P &lt;.05)

**Discussion**

Complications of tracheostomy have been extensively studied and found to be decreased with improvements in operative skills and advancements in intensive care<sup>7</sup>. In this study, 120 tracheotomies were studied with report of male predominance.

In this study 40.83% of tracheostomized patients had complications. Among them patient with emergency tracheostomy was 53.33%(40) and elective tracheostomy was 20%<sup>8,9</sup>. In other study in Bangladesh this complications for elective tracheostomy was 9.99% & emergency tracheostomy was

33.35%<sup>3</sup>. Study of Goldenberg D reported complications were more common in cases of emergency tracheostomy (43.26%) than elective (17.8%), total complications was 39.05%<sup>10</sup>.

Most retrospective studies have shown the overall incidence of complications were from 5% to 40%. The rate of complications was similar to previous studies carried in home & abroad<sup>8</sup>.

Here in this study complications were 3.63 times more common in cases of emergency tracheostomy than elective tracheostomy. That was consistent with the study done by Choudhury et al<sup>3</sup>, that was about 3 times more common than elective tracheostomy. It was more than double in study of Dhaka Medical College Hospital. The frequency of complications had no association with the pathological conditions necessitating tracheostomy. In comparison of two groups of patients (elective tracheostomy and emergency tracheostomy) the incidence of operative complications had found significantly different ( $p < 0.05$ ).

Among the complications of tracheostomy, haemorrhage was the most common complication (8.33%). In other study in this country hemorrhage was second commonest complication both for elective (3.33%) and emergency tracheostomy (6.67%)<sup>3</sup>. In other studies it was 3.7% and 5.0%<sup>11</sup> in elective and emergency tracheostomy.

Haemorrhage is the most common complication of tracheostomy and occurs from anterior jugular vein, middle thyroid veins & thyroid gland. In a meta-analysis, haemorrhage was the most frequent complication of tracheostomy<sup>8</sup>. minor haemorrhage occurring in 60% cases and major haemorrhage in 2% cases<sup>23</sup>. reported significant difference between occurrence of mild and severe haemorrhage in emergency tracheostomy<sup>12</sup>.

Surgical emphysema is another common complication after emergency tracheostomy. 5.83% patient developed surgical emphysema, 8% of emergency tracheostomy developed this in this study<sup>13</sup>. In other study surgical emphysema was commonest complications both for elective (3.33%) & emergency tracheostomy (10%)<sup>3</sup> In another study. Rates of surgical emphysema and in elective tracheostomy as, 5%<sup>9</sup>, complications surgical emphysema is the commonest complication followed by haemorrhage<sup>10</sup>. These findings are consistent with results of this study however the rates of these complications differ from the other study<sup>11</sup>. The reason for this discrepancy was that in their study all tracheostomies were performed by senior registrars or consultant ENT specialists where as in this study all tracheostomies were performed by trainee surgeons. surgical emphysema does occur more frequently in emergency tracheostomy, a finding that was confirmed in this study<sup>12</sup>. Surgical emphysema was the commonest complication (9.47%). Subcutaneous emphysema can be alarming, but is seldom fatal. 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 by the seventh day, unless the precipitating factors persist. To tight closure of the skin or subcutaneous tissue, too large incision in the trachea, improperly fitting tracheostomy tube and excessive coughing are the causative factors. The risk of tracheostomy tube displacement is increased in cases of marked surgical emphysema due to increase in neck swelling.

Wound infection developed only 5.43% patient. Wound infection was found in a previous study was 3.33%<sup>3</sup> and 2.96%<sup>14</sup> both cases in elective and emergency tracheostomy .

A tracheostomy is a clean contaminated wound. The reported incidence of infection is highly dependent upon the criteria of infection of the individual study and the post operative care available. While the rate of stomal infection has been reported as high as 36%<sup>13</sup> The incidence of cellulitis and purulence has generally been reported from 3 to 8%. Stomal infection usually manifests as an indolent infection, mild cellulitis or granulation tissue formation. It is a frequent complication of tracheostomy and its occurrence is not dependent on the preoperative condition but on the post-operative wound care. This result was consistent with some other studies<sup>14</sup>. In a study, bacterial contamination in open tracheostomy was 35% cases. Fortunately this infection is local, indolent and produces cellulitis with formation of granulation tissues. Antibiotics are seldom necessary as the wound is open and drainage is adequate<sup>15</sup>.

Tube displacement was found 4.47% in elective and 5.33% in emergency tracheostomy. Length of the tube and thickness of the neck are clearly the most important factors; postoperative oedema, haematoma and emphysema causes broadening of the distance between the skin surface and the anterior wall of the trachea. Overweight patient or patient with full neck or when the patient coughs excessively or moves the head tube can easily slipped out of the trachea and into the interstitial tissues of the neck<sup>16</sup>.

Tube blockage was found in 2.67% in cases of emergency and 2.2% in elective tracheostomy. Tube blockage was found in 3.33% cases of emergency tracheostomy but there is no tube- blockage in elective tracheostomy<sup>3</sup>. In some other studies it was found to be in 2% and 3.5%<sup>12</sup> cases respectively. Tracheostomy alters the basic physiology of the inspired air from filtered, warm and humidified to dry cold air coming

into direct contact with the trachea. This alteration dries the tracheal and pulmonary secretions and interferes with capacity of ciliary movement in the mucous blankets, and thus causes production of thick, tenacious mucous scabs & crusts. If the situation is not controlled the scab will increase in size with the result that they are difficult or impossible to cough out or even removal by suction

Cardiac arrest occurred in one case in this study. In a meta analysis, among 10000 patients cardiac arrest occurred only in 3 cases<sup>16</sup>.

### Conclusion

Though this study was limited and purposive it may have some biased result but as authors have covered big four tertiary hospital in the country where maximum number of tracheostomy are performed so the result can reflect the real picture and also can suggest some way which can be utilized to minimize the morbidity of this life saving surgery.

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