ORIGINAL ARTICLE

# EARLY COMPLICATIONS OF ELECTIVE AND EMERGENCY TRACHEOSTOMY

**Raza Muhammad, Farida Khan, Fazal Rehman*, Johar Iqbal*, Munib Khan*, Gohar Ullah***

**Department of ENT, Ayub Medical College and Teaching Hospital Abbottabad, *Hayatabad Medical Complex, Peshawar, Pakistan**

**Background:** Tracheostomy is a life saving procedure when it is performed for an appropriate indication and surgical technique. The aim of this study was to compare the early complications of elective and emergency tracheostomy in our setup. **Methods:** This comparative study was conducted at the ENT Department, Hayatabad Medical Complex (HMC) from March 2009 to March 2010. A total of 100 patients included in this study were divided in to two equal groups, group A undergoing elective tracheostomy and group B undergoing emergency tracheostomy. The results of hundred patients were compared and analysed from stand point of age, sex, disease pattern, operative procedure and postoperative complications associated with tracheostomy. **Results:** A total of 100 patients were included with age ranging from 17 to 88 years. The average age was 35 years in elective cases and was 32 years in emergency cases. The male to female ratio was 2.9:1 in elective cases and 4.6:1 in emergency cases. The overall complications rates were 38% in elective cases and 56% in emergency cases. **Conclusion:** Early complications of emergency tracheostomy are more common than elective tracheostomy.

**Keywords:** Tracheostomy, complications

## INTRODUCTION

Tracheostomy is generally described as a procedure that involves opening the trachea and exteriorising it to the cervical skin.[1,2] Tracheostomy has been performed all over the world for more than 2,000 years. It is a life saving procedure when it is performed for an appropriate indication and surgical technique. It is a commonly performed procedure nowadays for relieving upper airway obstruction, for intermittent positive pressure ventilation and lung toileting.[3]

Tracheostomy is frequently performed therapeutically as an elective procedure and only rarely as an emergency procedure.[4] Tracheostomy is a commonly performed procedure in critically ill patients in the intensive care unit.[5,6] Tracheostomy continues to be the standard procedure for management of long-term ventilator-dependent patients. It has several advantages over endotracheal intubation, including lower airway resistance, smaller dead space, less movement of the tube within the trachea, greater patient comfort, and more efficient suction.[7] The only indication for an emergency tracheostomy is to relieve acute airway obstruction and it should be performed within 2 or 3 minutes because anoxia can lead to death within 4 to 5 minutes. The majority of tracheostomies performed in the intensive care units need relatively a long term artificial airway.[8] Currently, tracheostomy is an established procedure for airway management in critically ill patients who require long-term mechanical ventilatory support. It is considered a superior procedure for the management of airway and has advantages over oral or nasal endotracheal intubation, but it may cause very serious complications.[9]

A tracheostomy may be performed surgically or percutaneously as an emergency or elective procedure, for a variety of indications. There is no conclusive evidence to justify recommending a surgical or percutaneous technique over the other.[10–12] Percutaneous dilatational tracheostomy is performed in the intensive care unit patients. It is the procedure of choice when performing tracheostomy in critically ill adults. It is done in a very short time at bedside and is a simple procedure.[9,13] Percutaneous dilatational tracheotomy is considered a safer procedure as compared to surgical tracheostomy because it has a lower rate of complications postoperatively.[14] Elective surgical tracheotomy is ideally performed in the operation theater.[15] Conventional surgical tracheostomy is performed through a sub thyroid incision of the trachea, between the second and third tracheal rings. Cricothyroidotomy has traditionally been used as an emergency procedure, due to the initially reported high incidence of subsequent subglottic stenosis with this procedure, which requires challenging surgical repair.[16]

Heffner concluded that in many articles it has been demonstrated by many evidences that percutaneous dilatational tracheostomy is considered as safe as the standard surgical procedure when considering perioperative and early postoperative complications.[17] The morbidity and mortality associated with tracheostomy is very low in the recent years. Early complications of tracheostomy, elective or emergency, include bleeding,[18,19] subcutaneous emphysema,[1,21] wound infection,[20,22] tube displacement[1,21] and tube obstruction[21]. Pneumomediastinum,[1] tracheoesophageal fistula,[1]

pneumothorax,[20,21] and recurrent laryngeal nerve injury[1] are amongst rare complications. The aim of this study is to compare the complications associated with emergency and elective tracheostomy in our setup.

## MATERIAL AND METHODS

This comparative study was conducted at the ENT Department, Hayatabad Medical Complex (HMC) from March 2009 to March 2010. Patients admitted through OPD or casualty or referred from other departments of Postgraduate Medical Institute, Hayatabad Medical Complex Peshawar for tracheostomy were included in the study. The inclusion criteria were patients of either sex, adults, with history of prolonged intubation, Patients with head and neck tumours, maxillofacial and head injuries causing airway obstruction, Patients with coma due to any cause to reduce dead space and facilitate tracheal toilet. An exclusion criterion was patients already tracheostomised and Patients with known bleeding disorders.

The registered subjects were allocated into two groups, group A undergoing tracheostomy electively and group B undergoing tracheostomy in emergency. Patients were allocated to either group A or B. The procedure was properly explained to the attendants and informed consent was taken as a part of ethical concern. Tracheostomy was performed in operation theatre using conventional open surgical technique. It involved local anaesthesia and proper positioning of patient, transverse skin incision, dissection of underlying structures and cannulation of trachea. In all procedures Portex tube of 7 or 7.5 internal diameter was used. Postoperatively patients were retained in the Ear Nose and Throat ward or surgical intensive care units. Bleeding was considered significant if it was more than 20 ml as measured in the suction bottle. Recurrent laryngeal nerve palsy assessed by hoarseness of voice and indirect laryngoscopy. Chest X-ray postero-anterior view and neck X-ray lateral view were performed within 6 hours postoperatively to look for complications that included subcutaneous emphysema, pneumo-mediastinum and pneumothorax. Tube dislodgement was observed after surgery for 24 hours. Tube obstruction and wound infection were observed after surgery for seven days. Tracheoesophageal fistula was confirmed by giving some fluids orally which was leaked through the stoma. These early complications were labelled as yes or no if present or absent respectively on the performa already designed for the purpose.

Data were collected using the approved performa designed for the purpose and were analysed using SPSS-11.

## RESULTS

A total of 100 patients were included in the study over a period of one year from March 2009 to March 2010. The results of hundred patients were compared and analysed regarding age, sex, disease pattern, operative procedure and post operative complications associated with tracheostomy.

The total numbers of male patients in our study were 78, and females patients were 22. X-ray chest postero-anterior view and X-ray neck lateral view were done in all patients within 6 hours postoperatively for complications such as subcutaneous emphysema, pneumo-mediastinum and pneumothorax. The X-ray findings were normal in 48 cases of group A and 46 cases of group-B. Radiolucent striations on lateral X-rays were present in total of 6 patients; 4 in group B and only 2 in group A (Table-1).

The indications for tracheostomy in both groups were different from each other due to the elective and emergency nature of the diseases. In group A 22 patients underwent tracheostomy due to prolonged intubation and in 14 patients tracheostomy was done for chest toileting. In only 2 patients tracheostomy was done for aspiration pneumonia due to CVA.

In group B the laryngeal trauma patients outnumbered the group with 25 patients. In 9 patients tracheostomy was done for airway obstruction due to road traffic accident. In only 2 patients tracheostomy was done for dyspnoea in maxillofacial trauma. In 6 patients tracheostomy was done for aspiration pneumonia due to CVA. Only one patient was referred from neurosurgical department with fits and low oxygen saturation for tracheostomy. In only one patient of bomb blast victim tracheostomy was done to decrease the dead space and increase alveolar ventilation. As we can see in emergency group the majority of tracheostomies were done for trauma patients (Table-2).

In our study 53 (53%) patients had no complications; 31 (62%) in group A and 22 (44%) in group B. The results are listed in Table-3.

**Table-1: Age, gender and X-ray findings of patients**

| Parameter | Group-A | Group-B | Total |
|---|---|---|---|
| **Age** | | | |
| 15–35 | 34 | 32 | 66 |
| 36–55 | 10 | 13 | 32 |
| 56–75 | 4 | 3 | 7 |
| >75 | 2 | 2 | 4 |
| **Gender** | | | |
| Male | 37 | 41 | 78 |
| Female | 13 | 9 | 22 |
| **Findings in X-ray neck, Lateral view** | | | |
| Normal | 48 | 46 | 94 |
| Radiolucent Striations in the Neck | 2 | 4 | 6 |

**Table-2: Indications of tracheostomy**

| Indications | Group-A | Group-B | Total |
|---|---|---|---|
| Prolong intubation | 22 | - | 22 |
| Maxillectomy | 1 | - | 1 |
| Chest toileting | 14 | - | 14 |
| Ludwig's angina with dyspnoea | 2 | - | 2 |
| Laryngeal Ca with dyspnoea | 1 | - | 1 |
| CVA with aspiration pneumonia | 2 | 6 | 8 |
| Acoustic neuroma of CP angle | 1 | - | 1 |
| Hypopharyngeal Ca with Hypopha | 1 | - | 1 |
| post thyroidectomy bilateral vocal cord palsy | 1 | - | 1 |
| Angiofibroma | 1 | - | 1 |
| dropping of oxygen dropping of | 1 | - | 1 |
| Guillan Bare syndrome with dyspnoea | 1 | 1 | 2 |
| Tetunus with dyspnoea | 1 | - | 1 |
| Fire Arm injury with dyspnoea | 1 | 1 | 2 |
| RTA with Airway obstruction (dyspnoea) | - | 9 | 9 |
| Laryngeal trauma (dyspnoea) | - | 25 | 25 |
| Maxillofacial Trauma (dyspnoea) | - | 2 | 2 |
| Bomb blast injury with airway obstruction | - | 1 | 1 |
| DM with Fits and dyspnoea | - | 3 | 3 |
| Postcraniotomy with fits and dyspnoea | - | 1 | 1 |
| Others | - | 1 | 1 |

**Table-3: Complications of tracheostomy**

| Complications | Group-A | Group-B |
|---|---|---|
| Normal | 31 | 22 |
| Bleeding | 3 | 5 |
| Subcutaneous emphysema | 2 | 2 |
| Pneumothorax | 0 | 1 |
| Tube obstruction | 1 | 2 |
| Tube dislodgement | 5 | 8 |
| Wound infection | 8 | 10 |

## DISCUSSION

Tracheostomy is generally described as a procedure that involves opening the trachea and exteriorising it to the cervical skin. Attempts to save man's life through tracheostomy have been made from ancient time. Portrait of tracheostomy has been found on Egyptian tablet.[21]

A number of techniques have been described to limit the morbidity associated with tracheostomy. Percutaneous dilatational tracheostomy is simple, saves operating room burden and carries lower complication rate but the only hindrance to accept this in our setup is its high cost and surgical expertise. By comparison, conventional surgical tracheostomy carries higher incidence of postoperative complications.

Many tracheostomies are performed electively but some may be performed as an emergency procedure.[21] Elective tracheostomy is commonly performed in critically ill and prolonged ventilator dependant patients to provide long term airway access[22,23] and tracheal toileting. Emergency tracheostomy is usually encountered in patients with upper airway obstruction secondary to laryngeal growth, maxillofacial and laryngeal trauma, burns and upper airway infections.[24]

Early complications of tracheostomy, elective or emergency, include bleeding, subcutaneous emphysema, wound infection, tube displacement and tube obstruction. Pneumomediastinum, tracheoesophageal fistula, pneumothorax, and recurrent laryngeal nerve injury are amongst rare complications. The objective of my study was to help us in formulating the future strategy for avoiding complications and effective management of elective and emergency tracheostomy.[23,24]

Durbin[24] in 2005 in a randomised controlled study defined the types of haemorrhage, i.e., major and minor, but we mentioned only significant bleeding that was more than 20 ml in suction bottle. In that study haemorrhage occurred in 142 patients out of 10,000 patients (1%). In our study bleeding occurred in 8% patients.

In retrospective study conducted by Waldron[25] in 150 patients, in which haemorrhage occurred in one elective patient out of 112 (0.8%) and two out of 38 (5.2%) in emergency patients. The haemorrhage in elective patients in our study was 6% which is higher compared to that of international studies. Likewise the haemorrhage in emergency cases is also higher in our study. If we compare the rate of haemorrhage with national studies conducted by Shahabi[26] and Asmatullah[15], it is almost the same, i.e., 6%.

In Waldron[25] study pneumothorax occurred in one patient (0.6%) which is more in comparison with our study. Comparison of recent surgical and percutaneous tracheostomy trials shows that perioperative complications are more frequent with the percutaneous technique (10% versus 3%), whereas postoperative complications occur more often with surgical tracheotomy. This means that percutaneous tracheostomy is associated with a higher prevalence of perioperative complications and, especially, perioperative deaths and cardio respiratory arrests.

A nationwide study conducted by Fischler[27] in which complication rate of 13% was reported, bleeding and infections being at the top of the scale. Only 27% of the units performed late follow-up protocols. Despite its frequency, tracheostomy in Swiss ICUs is far from being standardized with regard to indication, timing and choice of technique.[27] In our study wound infection occurred in 18% of patients. In a study conducted by Patel[21] in 2005 in which pneumothorax occurred in 2 patients, with open surgical technique. This rate is higher if compared to our study in which pneumothorax occurred only in 1 patient. In another study conducted by Charles[28] in which pneumothorax occurred in four (1.7%) patients out of 236 patients. This is also higher than our study. According to him, the decision to place a

tracheostomy should be made by considering the balance between benefits versus risks of the procedure. Probably the best understood factors that should be taken into account are the acute risks of tracheostomy.

## CONCLUSION

The rate of early complications was higher in emergency tracheostomy compared to the elective tracheostomy. We recommend elective tracheostomy, unless there is acute upper airway obstruction.

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## Address for Correspondence:

**Dr. Raza Muhammad,** Department of ENT, Ayub Teaching Hospital, Abbottabad, Pakistan. **Cell:** +92-333-9153721
**Email:** raza_kmc_95@yahoo.com