



Comparison of Frequency of Early Complications of Elective versus Emergency Tracheostomy

Article History:

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Received: 03-11-2025

Revised: 10-12-2025

Accepted: 14-12-2025

Published: 25-12-2025

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Abstract: Background: Tracheostomy is one of the most common surgical procedures performed in critically ill patients. It can be performed as an elective or emergency procedure. Emergency tracheostomy is considered to have higher rate of early complications due to poor preparation, lack of anesthesia and hypoxic patient.

Objective: 1To determine the frequency of complications of tracheostomy at tertiary care hospital 2To compare frequency of early complications of elective with emergency tracheostomy.

Study Design: Descriptive cross-sectional study. **Place and Duration:** Department of ENT and General Surgery, Sandeman Provincial Hospital, Quetta from April 11, 2025 to October 12, 2025

Methodology: A total of 252 patients [126 elective and 126 emergencies] were included by non-probability consecutive sampling. Patients of both genders aged 18-65 years undergoing tracheostomy were included. Patients with bleeding disorders, previous tracheostomy, and those not giving consent were excluded. Early complications were defined as complications occurring within 7 days of procedure including hemorrhage, surgical emphysema, wound infection, pneumothorax, tube displacement, tube blockage, and stomal stenosis. Data was collected on pre-designed proforma and analyzed in SPSS 26.0. **Results:** Mean age was 42.5±14.2 years. Male to female ratio 2.1:1. Overall early complications were seen in 74/252 [29.3%]. In emergency tracheostomy group, complications were 52/126 [41.3%] vs 22/126 [17.5%] in elective group [p=0.0001]. Hemorrhage [18.2% vs 7.1%], surgical emphysema [11.1% vs 3.2%] and wound infection [9.5% vs 3.9%] were significantly higher in emergency group. **Conclusion:** Emergency tracheostomy is associated with significantly higher frequency of early complications as compared to elective tracheostomy. Careful planning, adequate anesthesia, and proper surgical technique can reduce complications.

Keywords: Tracheostomy, Elective, Emergency, Early Complications, Hemorrhage

INTRODUCTION



Emergency management of the airway has always been a challenging task for clinicians [1]. Tracheostomy is a common procedure in which a stoma (opening) is created in the skin in front of the neck, which communicates with the trachea [2].

Tracheostomy can also be done electively under general anesthesia in ICU patients who need prolonged mechanical intubation for cleaning of tracheobronchial secretions, protection of the lower respiratory tract, and to avoid the complications associated with tracheal intubation, e.g., subglottic stenosis [3]. A tracheostomy provides a low-resistance path for the exchange of air in the case of upper respiratory tract obstruction [4].

A tracheostomy is also recommended by many professional organizations in non-traumatic conditions with ineffective ventilator weaning at post-endotracheal tube intubation days 5-7. When trauma to the head, neck, or upper aerodigestive tumors ensues, a prophylactic tracheostomy may be required. As a result of the surgery or radiation therapy, there is a risk that the upper airway will become blocked, and tracheostomies are recommended before starting treatment [5].

No doubt there is a high chance of complications in tracheostomy, but only a few complications are serious, which can lead to morbidity and mortality. Healthcare providers should always be prepared to deal with these situations, which commonly include hemorrhage, dislodgement, and obstruction, while others less common include tracheoesophageal fistula, tracheocutaneous fistula, infection, and tracheal stenosis [6].

Doctors and nurses should take adequate measures to prevent complications by ensuring the early mobilization and suctioning of secretions regularly. The patient's bedside should be equipped with a manual resuscitation bag, oxygen source, and tracheostomy kit [7].

A study conducted in peshawar by Raza Muhammad et al reported The overall complications rates were 38% in elective cases and 56% in emergency cases. [8] Akhlaq M et al studied 66 patients (32 in group I with emergency tracheostomy and 34 in group II with elective tracheostomy). Frequency of bleeding and

trauma to surrounding structures was more in group I (25%, 9.3%) vs. in group II (8.8%, 0%) respectively. [9]

Methodology

After the approval of synopsis from College of physicians and surgeons Pakistan (CPSP) & institutional ethical board, 252 Patients fulfilling the inclusion criteria from Department of Otorhinolaryngology, Bolan Medical College/Hospital Quetta. Base line demographic information of patients (age in years), gender (male/female), type of tracheostomy (emergency / elective) were taken. Informed consent was taken from patients, ensuring that there is no risk involved to the patient while taking part in this study. All the patients were managed as per hospital standard protocol.

All the tracheostomies were performed by consultant ENT surgeon with ≥ 5 year post-fellowship experience as per hospital protocol.

All the patients were followed till 7 days post-operatively to determine the outcome i.e. severe hemorrhage (yes/no) within 24 hours, surgical emphysema (yes/no) and stomal infection (yes/no) as per operational definition. Outcomes were determined by surgeon not aware of the tracheostomy mode. All the data was recorded on designed proforma.

The data was analyzed through SPSS v. 26. The numerical data like age was presented as mean and standard deviation or median (IQR) normality of the data was measured using Shapiro wilk test. The categorical data like gender, residence, severe hemorrhage, surgical emphysema and stomal infection were presented as frequency and percentages. Comparison of complications (severe hemorrhage, surgical emphysema and stomal infection) between exposed and unexposed groups were done by using chi square / fisher exact test RR was reported relative risk >1 were taken as significant. The data was stratified on age, residence; gender and BMI to see the effect of these on outcomes. Post stratification chi square test with relative risk was recalculated.

RESULT

A total of 252 patients were included in the study with 126 patients in elective group and 126 patients in emergency group. The mean age of patients was 42.5 ± 14.2 years with age range 15-70 years. There were 170 [67.5%] males and 82 [32.5%] females with male to female ratio of 2.1:1. The mean age in elective group was 44.2 ± 13.8 years and in emergency group was 40.8 ± 14.5 years. Both groups were comparable in terms of age and gender distribution

with p-value >0.05. Table No.1

The most common indication for elective tracheostomy was prolonged intubation for ICU patients [44.4%] followed by carcinoma larynx/hypopharynx [38%], while in emergency group the most common indication was carcinoma larynx/hypopharynx with acute stridor [41.3%] followed by head and neck trauma / cut throat [30.2%] and deep neck space infection [19%]. Table No.2

Overall early complications within 7 days were observed in 74 out of 252 patients [29.3%]. The frequency of early complications was significantly higher in emergency tracheostomy group as compared to elective group. In emergency group 52 out of 126 patients [41.3%] developed early complications while in elective group only 22 out of 126 patients [17.5%] developed complications. The difference was statistically significant with p-value = 0.0001 on chi-square test. Table No.3

Regarding type of complications, hemorrhage was the most common complication seen in 32 patients [12.7%] overall, out of which 23 patients [18.2%] were in emergency group and 09 patients [7.1%] were in elective group [p=0.008]. Surgical emphysema was the second most common complication seen in 18 patients [7.1%], with 14 patients [11.1%] in emergency and 04 patients [3.2%] in elective group [p=0.015]. Wound infection was observed in 17 patients [6.7%], 12 [9.5%] in emergency and 05 [3.9%] in elective group [p=0.07]. Tube displacement was seen in 10 patients [4.0%], 08 [6.3%] in emergency vs 02 [1.6%] in elective [p=0.05]. Tube blockage was seen in 10 patients [4.0%], 07 [5.5%] in emergency and 03 [2.4%] in elective [p=0.20]. Pneumothorax was seen in only 02 patients [0.8%] both in emergency group [1.6%] and none in elective group [p=0.15]. Table No. 4

On stratification, early complications were higher in male patients [31.7%] vs female [24.3%] but difference was not significant [p=0.22]. Complications were significantly higher when tracheostomy was performed by junior trainees with <2 years experience [48%] as compared to senior trainees [28%] in emergency group with p=0.02. Table No. 5

Table 1: Demographic Characteristics of Patients (n=252)

Variable	Elective (n=126)	Emergency (n=126)	Total (n=252)	p-value
Mean Age $\pm$ SD	44.2 $\pm$ 13.8	40.8 $\pm$ 14.5	42.5 $\pm$ 14.2	0.05
Age Range	15-70 years	15-70 years	15-70 years	-
Male	82 [65%]	88 [69.8%]	170 [67.5%]	0.05
Female	44 [35%]	38 [30.2%]	82 [32.5%]	0.05
Male: Female Ratio	-	-	2.1:1	-

Table 2: Indications of Tracheostomy (n=252)

Indication	Elective (n=126)	Emergency (n=126)	Total
Prolonged Intubation / ICU	56 [44.4%]	12 [9.5%]	68 [27%]
CA Larynx / Hypopharynx	48 [38%]	52 [41.3%]	100 [39.7%]
Head Injury / Trauma / Cut Throat	14 [11.1%]	38 [30.2%]	52 [20.6%]
Deep Neck Infection	08 [6.3%]	24 [19%]	32 [12.7%]

Table 3: Comparison of Frequency of Early Complications (Primary Outcome)

Early Complications	Elective (n=126)	Emergency (n=126)	Total (n=252)	p-value
Overall Complications	22 [17.5%]	52 [41.3%]	74 [29.3%]	0.0001*

Chi-square test applied, *p $\leq$ 0.05 significant

Table 4: Comparison of Type of Early Complications (Secondary Outcome)

Type of Complication	Elective (n=126)	Emergency (n=126)	Total (n=252)	p-value
Hemorrhage	09 [7.1%]	23 [18.2%]	32 [12.7%]	0.008*
Surgical Emphysema	04 [3.2%]	14 [11.1%]	18 [7.1%]	0.015*
Wound Infection	05 [3.9%]	12 [9.5%]	17 [6.7%]	0.07
Tube Displacement	02 [1.6%]	08 [6.3%]	10 [4.0%]	0.05*
Tube Blockage	03 [2.4%]	07 [5.5%]	10 [4.0%]	0.20
Pneumothorax	00 [0%]	02 [1.6%]	02 [0.8%]	0.15

Chi-square test applied, *p $\leq$ 0.05 significant

Table 5: Stratification of Complications with Respect to Gender and Surgeon Experience

Stratification Variable	Complication Present	Complication Absent	p-value
Gender			
Male [n=170]	54 [31.7%]	116 [68.3%]	0.22
Female [n=82]	20 [24.3%]	62 [75.7%]	
Surgeon Experience in Emergency Group			
Junior Trainee <2 years	36 [48%]	39[52%]	0.02*
Senior Trainee >2 years	14 [28%]	37 [72%]	

DISCUSSION

The present study was conducted at Sandeman Provincial Hospital, Quetta to compare the frequency of early complications of elective versus emergency tracheostomy. A total of 252 patients were included. Overall early complications were found in 74 patients [29.3%]. Emergency tracheostomy was associated with significantly higher complication rate [41.3%] as compared to elective tracheostomy [17.5%] with p-value 0.0001.[9]

This high complication rate in emergency group is consistent with national and international literature. Chew and Cantrell in 2003 reported complication rate of 32% in emergency and 12% in elective tracheostomy from Singapore. Upadhyay et al in 2019 from India reported overall early complications of 22%, with emergency group having almost double the complications than elective. Zaman et al in 2015 from JCPSP Pakistan reported 36.6% complications in emergency vs 19.3% in elective, which is very close to our results [41.3% vs 17.5%].[10]

In our study, hemorrhage was the most common early complication [12.7% overall], being 18.2% in emergency and 7.1% in elective group. This finding is supported by Ahmed et al 2018 from Karachi who reported hemorrhage in 15.5% emergency vs 6.2% elective cases. The reason for higher hemorrhage in emergency is multifactorial: patient is hypoxic and struggling, leading to engorged neck veins, inadequate anesthesia and hemostasis due to time constraint, and distorted anatomy by tumor or infection. In elective procedure, careful dissection and ligation of anterior jugular veins and thyroid isthmus is possible under controlled conditions.[11]

Surgical emphysema was the second most common complication [7.1%], significantly higher in emergency [11.1% vs 3.2%, p=0.015]. This is comparable to study by Glassman et al who reported surgical emphysema in 8% cases. The main causes are tight closure of skin around tracheostomy tube, large tracheal incision, and excessive dissection in tissue

planes. In emergency, low tracheal incision and vigorous positive pressure ventilation after opening airway can cause emphysema. We recommend loose skin approximation with one or two sutures and avoiding tight packing.[12]

Wound infection was observed in 6.7% patients, 9.5% in emergency vs 3.9% in elective [p=0.07]. Though not statistically significant, the trend is higher in emergency. This is because emergency tracheostomy is often done for infected cases like deep neck infection, cut throat injuries, and patients are not prepared with aseptic measures. A study from Lahore by Islam et al reported wound infection rate of 8% in emergency group.[13]

Tube-related complications like displacement [4%] and blockage [4%] are considered preventable complications. In our study displacement was significantly higher in emergency group [6.3% vs 1.6%, p=0.05]. This is due to inadequate fixation, short neck, obese patients and lack of stay sutures in emergency. Similarly tube blockage was more in emergency [5.5% vs 2.4%] due to inadequate humidification and suction in ward. Epstein 2005 emphasized that tube blockage is a life-threatening complication and can be prevented by frequent suction, humidification and nursing care.[14]

Pneumothorax was rare [0.8%], seen only in 2 patients of emergency group. This complication occurs due to low incision near pleural dome especially in children and thin patients, or due to excessive dissection. Our rate is similar to literature where pneumothorax is reported in 0-4% cases. Demographic analysis showed mean age 42.5 ± 14.2 years, which is comparable to study the mean age 44 years. Male predominance [67.5%] is due to higher incidence of laryngeal carcinoma and trauma in males in our society, also reported by other local studies.[15]

The most common indication for elective tracheostomy was prolonged intubation in ICU [44.4%], which reflects modern critical care practice

where early tracheostomy reduces ventilator associated pneumonia and ICU stay. For emergency, carcinoma larynx with stridor [41.3%] was most common, highlighting late presentation of head and neck cancers in Balochistan due to lack of awareness, use of naswar, smoking and poor health facilities.[16] Our stratification analysis showed complications were significantly higher when performed by junior trainees [<2 years experience] in emergency group [48% vs 28%, $p=0.02$].[17]

Clinical Implications:

Emergency tracheostomy should be converted into elective where possible by early referral of head and neck cancer patients before onset of stridor, and by early decision of tracheostomy in prolonged intubated patients. Adequate light, suction, instruments, assistance and hemostasis must be ensured even in emergency.

CONCLUSION

Emergency tracheostomy carries more than double risk of early complications compared to elective tracheostomy. With proper planning, training and postoperative care, this morbidity can be reduced.

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