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COMMON INDICATIONS, COMPLICATIONS, AND OUTCOMES RELATED TO TRACHEOSTOMY- A CROSS-SECTIONAL STUDY

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Abstract: Background: A tracheostomy is a surgical procedure in which an opening is made in the anterior wall of the trachea to establish and maintain an airway. It provides an alternative airway when the normal upper airway is obstructed or inadequate. It is a commonly performed procedure in otolaryngological practice. This study was conducted to determine the common indications, complications, and outcomes of tracheostomy. **Methods:** This prospective observational study was conducted on 68 patients aged >18 years at SHED Hospital, Karachi, over a period of six months from September 2023 to February 2024. Patients were recruited using non-probability consecutive sampling. Data were analyzed using SPSS version 26. **Results:** The mean age of the patients was 23 ± 7.1 years. Thirty-six (53.3%) patients were male and 32 (46.7%) were female. The most common indication for tracheostomy was upper airway obstruction due to tumors, which was observed in 23 (33.8%) patients. The most common complication was bleeding, occurring in 10 (14.7%) patients. No procedure-related mortality was observed. **Conclusion:** Tumor-related upper airway obstruction was the most common indication for tracheostomy in our study. Bleeding was the most frequently observed complication. No procedure-related mortality was observed.

Keywords: Complication, Emergency, Indications, Outcome, Tracheostomy.

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INTRODUCTION

Tracheostomy was first described in the first century BC. It is a surgical procedure in which an opening is created in the anterior wall of the trachea and maintained with a tracheostomy tube to provide an alternative airway.1 When performed for an appropriate indication and by trained personnel, tracheostomy can be a life-saving procedure.2

Other methods of airway management include cricothyrotomy, endotracheal intubation, and percutaneous dilatational tracheostomy (PDT).3 Since its introduction, PDT has become an established alternative to conventional surgical tracheostomy, particularly in critically ill patients.4,5 However, its use may be limited in resource-constrained settings. PDT can be performed in selected critically ill patients and may be quicker and less invasive than conventional surgical tracheostomy.4,5

Although tracheostomy may occasionally be performed under local anaesthesia in emergency situations, percutaneous tracheostomy is generally performed as a planned procedure in appropriately selected patients, usually those who are already intubated.6 The indications for tracheostomy have changed over time, and commonly reported indications now include upper airway obstruction, prolonged mechanical ventilation, airway protection, and assistance with tracheobronchial toileting.5-8

Tracheostomy is associated with a number of complications that may occur during the procedure or in the postoperative period.7 Emergency tracheostomy may carry a greater risk of complications than elective procedures.8 Published studies have reported varying rates of tracheostomy-related complications, ranging from 6% to 66%.9,10 Many of these complications can be reduced by appropriate patient selection, careful surgical technique, and proper postoperative care.
Although tracheostomy is commonly performed in critically ill patients, there is limited local information regarding its indications, complications, and short-term outcomes in our setting. Therefore, this study aimed to determine the common indications for tracheostomy and to assess its complications and short-term outcomes in patients presenting to our hospital.

METHODOLOGY

The study was conducted after obtaining approval from the Institutional Review Board (IRB) of SHED Hospital, Karachi (IRB Ref. # 00IRB-SH/Approval/2023/785) on July 15, 2023. A non-probability consecutive sampling technique was used to recruit 68 patients of either sex who underwent tracheostomy between September 2023 and February 2024. All participants were older than 18 years. Patients with a known bleeding disorder were excluded. Patients who refused to provide written informed consent were also excluded from the study.
The sample size was calculated using an anticipated incidence of 9.5%, a margin of error of 7%, and a 95% confidence level. The calculated sample size was 68 patients. OpenEpi was used for sample size calculation. Written informed consent was obtained from all participants before enrolment in the study.

A pre-designed data collection form was used to record demographic information, including age and gender, as well as the indication for tracheostomy, type of tracheostomy, complications, and immediate outcome. Intraoperative complications were recorded during the procedure, while postoperative complications were assessed 48 hours after tracheostomy. Data regarding the relevant surgical procedures performed in the ENT department were also recorded.

Complications occurring within 48 hours of the procedure were considered immediate complications. SPSS version 26 was used for data analysis. Mean ± SD was calculated for quantitative variables, while frequencies and percentages were calculated for qualitative variables.

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RESULT

Table 1 presents the baseline characteristics of the patients. The mean age was 23 ± 7.1 years. Thirty-six (53.3%) patients were male, while 32 (46.7%) were female. The mean tracheostomy tube size was 6.63 ± 1.32 Portex. Local anaesthesia was used in 39 (56.7%) cases, while general anaesthesia was used in 29 (43.3%) cases. Twenty-nine (43.3%) patients underwent elective tracheostomy, whereas 39 (56.7%) underwent emergency tracheostomy. A transverse tracheal incision was performed in 54 (80%) cases, while vertical and Björk incisions were performed in 7 (10%) cases each. A transverse skin incision was used in 50 (73.3%) cases, while 18 (26.7%) had a vertical skin incision.

Table 1: Baseline characteristics of the patients

Baseline characteristics	Mean ± SD / n (%)
Age (years)	23 ± 7.1
Gender	
Male	36 (53.3%)
Female	32 (46.7%)
Type of anaesthesia	
General	29 (43.3%)
Local	39 (56.7%)
Type of tracheostomy	
Elective	29 (43.3%)
Emergency	39 (56.7%)
Type of tracheal incision	
Transverse	54 (80%)
Vertical	7 (10%)
Björk technique	7 (10%)
Skin incision	
Transverse	50 (73.3%)
Vertical	18 (26.7%)
Size of tracheostomy tube (Portex)	6.63 ± 1.32

Table 2 presents the common indications for tracheostomy. Tumor-related upper airway obstruction was the most common indication, occurring in 23 (33.8%) patients. This was followed by ventilatory support/toileting in 14 (20.5%) patients and prolonged intubation in 11 (16.2%) patients. Other indications included recurrent respiratory papillomatosis, severe head injury with upper airway obstruction, vocal cord palsy following thyroidectomy, and huge goiter with difficult intubation.

Table 2: Common indications for tracheostomy

Indications	Frequency (%)
Recurrent respiratory papillomatosis	2 (2.9%)
Tumors with upper airway obstruction	23 (33.8%)
Ventilatory support/toileting	14 (20.5%)
Prolonged intubation	11 (16.2%)
Trauma	0 (0%)
Acute UAO secondary to laryngeal tumor	20 (29.4%)
Severe head injury with UAO	2 (2.9%)
Foreign body in upper aerodigestive tract with UAO	0 (0%)
Poisoning	0 (0%)
Vocal cord palsy secondary to thyroidectomy	2 (2.9%)
Huge goiter with difficult intubation	2 (2.9%)
Subglottic stenosis	0 (0%)
Neuromuscular disease	0 (0%)

Table 3 presents the complications observed following tracheostomy. Bleeding was the most common complication, occurring in 10 (14.7%) patients, followed by subcutaneous emphysema in 5 (7.3%) patients and accidental cannulation in 4 (5.8%) patients. Other complications included tracheostomy tube blockage, displacement of the tracheostomy tube, pneumomediastinum, tracheoesophageal fistula, cuff leak, wound infection, difficult cannulation, and tracheal stenosis.

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Table 3: Complications of tracheostomy

Complications	Frequency (%)
Subcutaneous emphysema	5 (7.3%)
Suprasternal granulation	0 (0%)
Bleeding	10 (14.7%)
Accidental cannulation	4 (5.8%)
Tracheal stenosis	1 (1.47%)
Tracheostomy tube blockage	3 (4.4%)
Displacement of tracheostomy tube	2 (2.9%)
Difficult cannulation	1 (1.47%)
Pneumomediastinum	2 (2.9%)
Tracheoesophageal fistula	2 (2.9%)
Tracheovascular fistula	0 (0%)
Cuff leak	2 (2.9%)
Wound infection	2 (2.9%)

Table 4 presents the outcomes of tracheostomy. The mean duration of hospital stay was 24.73 ± 15.8 days. Decannulation of temporary tracheostomy was achieved in 16 (23.5%) patients. No procedure-related mortality was observed.

Table 4: Outcomes of tracheostomy

Outcomes	Mean ± SD / n (%)
Duration of hospital stay (days)	24.73 ± 15.8
Decannulation of temporary tracheostomy	16 (23.5%)
Death	0 (0%)

DISCUSSION

The indications for tracheostomy have changed over the last two decades. The number of tracheostomies performed for inflammatory conditions such as epiglottitis and laryngotracheobronchitis (croup) has decreased with the availability of safer endotracheal intubation techniques and improved anaesthetic equipment. The most common indication for tracheostomy varies according to the disease burden, healthcare facilities, and referral patterns of a particular region. There is limited information regarding the indications and outcomes of tracheostomy in our local population, as most available studies have been conducted in other settings.[10] The healthcare conditions in Eastern and Southern Asia differ from those in many other regions in terms of socioeconomic conditions, healthcare access, disease patterns, and referral systems. Therefore, local data are important for understanding the indications, complications, and outcomes of tracheostomy in our population.[11,12]

Tracheostomy remains a commonly performed surgical procedure for patients with severe illness and upper airway or respiratory problems. In the present study, patients were older than 18 years, and males constituted a slightly higher proportion of the study population than females. This finding is consistent with observations reported in previous studies.[5,6] Tumor-related upper airway obstruction was the most common indication for tracheostomy in our study, accounting for 23 (33.8%) cases. This finding is consistent with the study by Okoye BC, in which relief of upper airway obstruction accounted for 70% of tracheostomies. Other studies have also reported upper airway obstruction as one of the leading indications for tracheostomy.[11-13] However, the pattern of indications varies between regions. Some studies have reported prolonged intubation as the most common indication, with rates of 55.2% and 95% reported in Rwanda and India, respectively.[14,15] Another study reported pulmonary toileting as the most frequent indication.[8] These differences may reflect variations in patient characteristics, disease patterns, intensive care practices, and availability of healthcare resources.

Tracheostomy is an effective and potentially life-saving procedure, but it is associated with complications. In our study, the complications observed included bleeding, subcutaneous emphysema, accidental cannulation, tracheostomy tube blockage, wound infection, tube displacement, pneumomediastinum, tracheoesophageal fistula, cuff leak, and difficult cannulation. Bleeding was the most frequently observed complication, occurring in 10 (14.7%) patients, followed by subcutaneous emphysema in 5 (7.3%) patients, accidental cannulation in 4 (5.8%), and tracheostomy tube blockage in 3 (4.4%) patients. Wound infection occurred in 2 (2.9%) patients, while displacement of the tracheostomy tube, pneumomediastinum, tracheoesophageal fistula, and cuff leak occurred in 2 (2.9%) patients each. Difficult cannulation was

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observed in 1 (1.47%) patient. These findings are broadly comparable with those reported by Mohmud et al. and Chowdhury et al.[16,17]

Similar to our findings, Perfeito et al.[18] reported bleeding as the most common early complication, while wound infection was more frequently observed as a late complication. The rate of wound infection in their study was 2.73%, which is close to the 2.9% observed in our study. Another study by Datta et al.[19] reported wound infection in approximately 2% of cases. Studies by Rahman et al.[20] and Ahmed et al. have also reported complications comparable to those observed in our study. These similarities suggest that bleeding, local wound problems, and tube-related complications remain important concerns following tracheostomy.

In our study, bleeding was managed with appropriate intraoperative haemostasis, including pressure over the bleeding site and ligation where required. Subcutaneous emphysema was managed by relieving excessively tight sutures, while patients with wound infection were treated with regular wound dressing and appropriate antibiotics. Mohmud et al. and Chandra et al. also reported comparable findings regarding tracheostomy-related complications.[21-23] Early recognition and appropriate management of these complications are important for preventing further morbidity.

All patients undergoing emergency or elective tracheostomy were admitted and appropriately assessed. Emergency tracheostomy was performed under local anaesthesia in selected patients, while elective procedures were generally performed under general anaesthesia where appropriate. No procedure-related mortality was observed in our study. This finding is consistent with the study conducted by Rohail A and colleagues in Lahore, Pakistan.[1]

The mean duration of hospital stay in our study was 24.73 ± 15.8 days. This duration appears longer than that reported in some studies from developed countries.[24,25] The prolonged hospital stay in our population may be related to the underlying conditions requiring tracheostomy, the severity of illness, the need for continued airway care, and the occurrence of postoperative complications. Appropriate discharge planning, caregiver education, and continuity of tracheostomy care after discharge may help improve patient recovery and facilitate community-based care.

Our study adds local data from a tertiary care hospital in Karachi and provides information from a setting in which published evidence on tracheostomy outcomes is relatively limited. In addition to indications and complications, we documented procedural characteristics such as the type of skin and tracheal incision, anaesthetic technique, and tracheostomy tube size. We also assessed immediate postoperative complications within 48 hours, allowing us to describe the early safety profile of the procedure in our setting.[2-6]

Emergency tracheostomy accounted for 56.7% of the procedures in our study, compared with 43.3% performed electively. This relatively high proportion of emergency procedures may reflect the pattern of presentation and referral to our hospital.[11-13] The absence of procedure-related mortality in our study is encouraging, although it should be interpreted in the context of the relatively small sample size and short follow-up period.[1]

No cases related to poisoning, trauma, or foreign body obstruction were recorded in our study. However, these findings should be interpreted cautiously because the study was conducted at a single centre and involved a relatively small number of patients. The distribution of indications may differ in other hospitals and regions depending on the patient population and referral pattern.

Strengths and limitations

A strength of this study is that it provides locally relevant information on the indications, complications, and short-term outcomes of tracheostomy in a resource-limited clinical setting. The study also included details of the surgical technique and anaesthesia used, which are not consistently reported in local studies.

There are several limitations. The sample size was relatively small and the study was conducted at a single centre, which may limit the generalizability of the findings. In addition, follow-up was limited to the immediate postoperative period, so long-term outcomes such as late tracheal stenosis, delayed wound complications, and long-term decannulation outcomes could not be assessed. Patients with known bleeding disorders were excluded; however, no patient was actually excluded on this basis during the study period. Therefore, this exclusion criterion did not affect the final sample.

CONCLUSION

In this study, tumor-related upper airway obstruction was the most common indication for tracheostomy. Bleeding was the most frequently observed complication, followed by subcutaneous emphysema and tube-related complications. No procedure-related mortality was observed. Emergency and elective tracheostomies were successfully performed under appropriate anaesthetic conditions, with emergency procedures performed under local anaesthesia in selected cases.

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Most complications were identified early and managed appropriately. The findings highlight the importance of careful patient assessment, appropriate surgical technique, close postoperative monitoring, and timely management of complications. Larger multicentre studies with longer follow-up are needed to provide a broader understanding of the long-term outcomes of tracheostomy in our population.

ETHICS APPROVAL: The ERC gave ethical review approval.

CONSENT TO PARTICIPATE: Written and verbal consent was taken from subjects and next of kin.

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CONFLICT OF INTEREST: No competing interest declared

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