Acta Scientific Otolaryngology (ISSN: 2582-5550)

Volume 7 Issue 10 October 2025

Research Article

Challenges in Adult Tracheostomy Procedures: A Prospective Observational Study

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Received: July 16, 2025

Published: September 12, 2025

Abstract

Tracheostomy remains a vital procedure in airway management, particularly for patients requiring prolonged mechanical ventilation. This prospective observational study analyzes 70 adult tracheostomies performed over 18 months in a tertiary care centre, identifying key challenges faced during preoperative planning, intraoperative technique, and postoperative recovery. While most procedures were uneventful, notable hurdles included difficult anatomical access, intraoperative bleeding, and delayed decannulation. The study underscores the importance of anatomical awareness, surgical strategy, and multidisciplinary care in overcoming these challenges.

Keywords: Tracheostomy; Airway Management; Complications; Decannulation; Surgical Technique

Introduction

Tracheostomy, the creation of a stoma into the trachea, is a life-saving intervention for airway obstruction and prolonged ventilation. Historically performed for upper airway obstruction, its indications have shifted toward elective procedures in ICU settings [1]. Despite its routine nature, tracheostomy carries risks that demand careful planning and execution. This study aims to identify perioperative challenges and complications in adult tracheostomy and propose strategies for improved outcomes.

Aims and Objectives

- To identify the timing and indications of tracheostomy.
- To identify important hurdles of tracheostomy procedure as well as in its early postoperative period.
- To identify measures to reduce the incidence of complications.
- To assess the outcomes of tracheostomy (This outcome value will give us the information required for patient/bystander counselling for tracheotomy in future.).

Methods

A prospective observational study was conducted in the ENT department of a tertiary care hospital over a period of 18 months. The inclusion criteria comprised all adult patients (>18 years) undergoing open surgical tracheostomy with informed consent. Patients who underwent percutaneous or mini tracheostomy, those who did not provide consent, and patients below 18 years of age were excluded. Data on demographics and disease profiles were collected. Findings from neck examinations, intraoperative events, their management, and postoperative outcomes were recorded. The outcomes of tracheostomy at a 3-month follow-up were also documented. All data were analyzed using descriptive statistics.

Results

Patient profile

- Total cases: 70
- Mean age: 44.2 years (range: 18–85)
- Gender: 70% male

Indications for tracheostomy

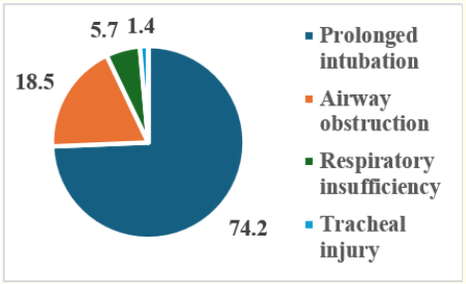

Chart 1: Indications for tracheostomy among study cases. Mean duration of intubation was 8.22 days.

Preoperative challenges

- Short neck: 14.3%
- Neck mass or edema: 10%
- Obesity-related anatomical difficulty: 5.7%

Figure 1: Study case showing short neck.

Intraoperative events

- Uneventful procedures: 76%
- Bleeding: 10%
- Presence of large vessels: 24.3%
- Bulky thyroid: 5.7%
- False passage or tracheal tear: 2.8%

Postoperative complications

- Tube block: 17.1%
- Surgical emphysema: 10%
- Tracheocutaneous fistula: 8.6%
- Tracheo-esophageal fistula: 2.9%

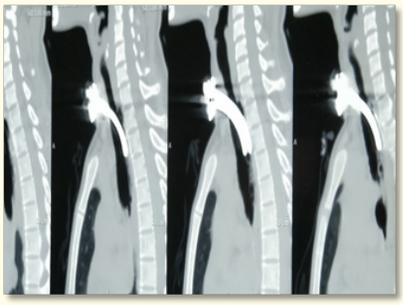

Figure 2: CT scan showing trachea-oesophageal fistula.

Tracheal stomal infection: 8.6%.

Outcome: It's the status of tracheostomy at 3 months follow up time.

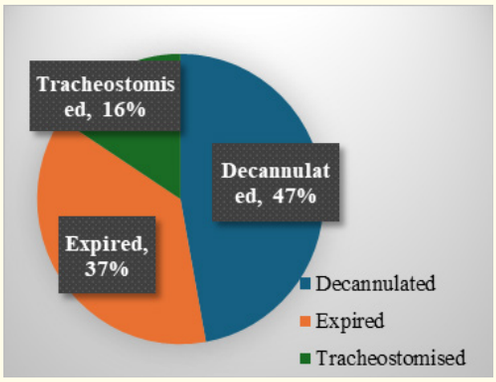

Chart 2: Outcome of tracheostomised patients among study cases.

Discussion

The predominance of tracheostomy for prolonged intubation reflects current ICU trends [2,6]. In our study, the predominant indication for tracheostomy was prolonged intubation, commonly due to chronic small airway disease, progressive laryngeal obstruction, or inhalational injury. Patients with altered blood gases required preparation with carbogen mix or brief tube occlusion, while those with neck edema or restricted extension necessitate careful tracheal palpation at each step, underscoring the need for meticulous intraoperative precautions.

In our study, the decision for tracheostomy in intubated patients was made by the ICU in charge, with a mean interval of 8

days post-intubation. This timing allows better prediction of prolonged ventilation needs while reducing risks such as intubation granuloma and tracheal stenosis from the endotracheal tube cuff.

Anatomical challenges such as short neck and obesity significantly increase procedural complexity like risk of bleeding with limited exposure and risk of false passage [3]. In our study, thyroid enlargement complicated three tracheostomies, necessitating isthmus ligation in two and a low tracheostomy in one, all managed with meticulous midline dissection under senior supervision to prevent major vascular or pleural injury. In two patients with cervical spine pathology, restricted neck extension impeded strap muscle dissection and tracheal exposure, necessitating an extended incision and larger retractors, with one patient remaining tracheostomy-dependent at 3 months due to delayed neurological recovery.

Surgical tracheostomy can generally be performed safely in anticoagulated patients, which occur in most of the ICU patients, though careful risk–benefit assessment and meticulous intraoperative precautions remain essential.

In our study, most tracheostomies were uneventful, with bleeding being the commonest intraoperative complication, mainly due to large vessels, bulky thyroid, or coagulation issues. Challenges included deep-seated trachea, anatomical variations, and difficult dissection in obese or short-necked patients. Large anterior vessels and bulky thyroid further complicated exposure. Most procedures were completed smoothly within 10–15 minutes, though difficult cases required longer. Careful dissection and adequate exposure were crucial for safe outcomes.

Bjork flap technique was employed in 97.2% of cases, aligning with literature that supports its safety and reduced incidence of tracheal stenosis [4].

Postoperative complications like tube block and surgical emphysema were managed conservatively. Tracheocutaneous and tracheo-oesophageal fistulas, though rare, highlight the need for vigilant follow-up and early intervention. Decannulation success was influenced by resolution of primary illness, airway patency, and patient cooperation.

Recent studies emphasize the role of early tracheostomy in reducing ICU stay, though survival benefits remain inconclusive [5,7,8]. Fibreoptic laryngoscopy and bedside bronchoscopy are valuable tools for assessing readiness for decannulation [1].

Conclusion

Adult tracheostomy, while often elective, presents significant challenges that can impact patient outcomes. Preoperative assessment, meticulous surgical technique, and structured post-operative care are essential to minimize complications. Standardized protocols and interdisciplinary collaboration can enhance safety and decannulation success.

Acknowledgments

We thank the patients, ICU staff, ENT department, and hospital administration for their support. Special appreciation to our Head of Department for guidance throughout the study.

Funding

None.

Conflict of Interest

None declared.

Ethical Approval

The study was approved by Institutional Ethics Committee.

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