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Case Report

Anesthesia challenges in a post-laryngectomy patient with acute unhealed stoma for pharyngocutaneous fistula repair

Naba Mateen Madoo[1]*, Jay Atul Kothari[1] Ravi kumar R.[1]

[1]Dept. of Anaesthesia, Lilavati Hospital and Research Centre, Mumbai Maharashtra, India.

Abstract

Pharyngocutaneous fistula (PCF) is a known complication following total laryngectomy, especially in patients who have undergone radiotherapy and present with multiple comorbidities, such as ischemic heart disease, diabetes, and hypertension. This case report presents the anesthetic challenges of managing a 75-year-old male with an unhealed stoma, who underwent surgical repair for a PCF. The patient had a complex history, including 35 cycles of radiotherapy, ischemic heart disease, diabetes, and hypertension. A multidisciplinary perioperative strategy was employed, focusing on airway management, hemodynamic optimization, and infection control measures. This case underscores the need for a tailored anesthetic approach in high-risk post-laryngectomy patients, highlighting the importance of careful planning and multidisciplinary collaboration.

Keywords: Pharyngocutaneous fistula, Total laryngectomy, Anesthesia, Fiberoptic intubation, Airway management, Hemodynamic optimization, Perioperative care

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1. Introduction

Pharyngocutaneous fistula (PCF) is a pathological communication between the pharynx and the skin that commonly occurs after total laryngectomy. The incidence of PCF following laryngectomy varies between 3% and 65% depending on patient factors and the surgical technique used.[1] The presence of pre-existing comorbidities such as ischemic heart disease, diabetes, malnutrition, and prior radiotherapy increases the risk of PCF formation and significantly complicates perioperative management.[2]

Post-laryngectomy patients present a variety of anesthetic challenges, including an altered airway anatomy, the risk of aspiration, and potential pulmonary complications. The presence of an unhealed stoma in these patients makes airway management even more complex, necessitating a tailored and meticulous approach. Airway difficulties may arise due to factors like tracheal stenosis, fibrosis, or recurrence of tumors. Furthermore, comorbid conditions, particularly cardiovascular disease, require careful hemodynamic management to mitigate perioperative risks.[3] This case report discusses the anesthetic considerations in a 75-year-old male with an unhealed stoma undergoing surgical repair for PCF, with an emphasis on advanced airway management, hemodynamic stability, and infection control.

2. Case Presentation

A 75-year-old male (weight: 52 kg, height: 163 cm, BMI: 19.6 kg/m²) presented to the hospital with persistent neck wound discharge 20 days after the removal of his tracheostomy. The patient had undergone total laryngectomy with pectoralis major myocutaneous (PMMC) flap reconstruction for squamous cell carcinoma of the right pyriform fossa. He had received 35 cycles of radiotherapy prior to surgery. His medical history was significant for

*Corresponding author: Naba Mateen Madoo
Email: nabamnm@gmail.com

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ischemic heart disease, diabetes mellitus (HbA1c 7.5%), and hypertension, which were all managed with appropriate medications.

On clinical examination, the patient had a small opening with seropurulent discharge along the surgical site, with surrounding erythema but no systemic signs of infection. A contrast study using Gastrografin swallow confirmed the presence of PCF, with contrast leakage from the right pyriform sinus to the exterior. His echocardiogram showed an ejection fraction of 50%, concentric left ventricular hypertrophy, and apical septal akinesis. A dobutamine stress test was negative for inducible ischemia. Laboratory results showed a hemoglobin of 9.4 g/dL, WBC of 6.17 × 10⁹/L, platelet count of 279 × 10⁹/L, and normal kidney and liver function tests.

Figure 1: Intra operative picture depicting flexo metallic tube placement.

Table 1: Patient's comorbidities and anesthetic management strategies

Comorbidity	Anesthetic Management Considerations
Ischemic Heart Disease	Maintain MAP between 65-75 mmHg to ensure adequate myocardial perfusion; careful monitoring for signs of ischemia
Diabetes Mellitus	Maintain strict intraoperative blood glucose control to promote wound healing and reduce infection risk
Hypertension	Avoid both intraoperative hypotension (compromising myocardial perfusion) and hypertension (increasing bleeding risk);
Prior Radiotherapy	Be aware of potential for difficult airway due to radiation-induced fibrosis or stenosis.

secured: a pre-existing 20-gauge IV in the left upper limb and an additional 18-gauge IV in the right upper limb. Additionally, a 20-gauge arterial line was inserted into the right upper limb under ultrasound guidance for continuous hemodynamic monitoring.

Table 2: Comparison of airway management techniques in post-laryngectomy patients with unhealed stoma

Technique	Rationale for Use	Advantages	Disadvantages/Reasons for Potential Unsuitability in This Case
Fiberoptic Bronchoscopy	Direct visualization of airway; assessment of patency and potential obstructions; guidance for endotracheal tube placement through stoma.	Controlled approach; minimizes risk of traumatic intubation; allows for clearance of secretions.	May require patient cooperation or sedation; requires expertise.
Awake Tracheostomy Re-cannulation	Secures airway in cases of anticipated difficult airway or failed intubation attempts.	Avoids general anesthesia and potential airway collapse during induction; provides definitive airway.	Invasive procedure; may cause patient discomfort; requires surgical expertise and time.
Jet Ventilation	Can provide ventilation when endotracheal tube might obstruct surgical field.	May offer better surgical access in certain procedures.	Does not provide definitive airway protection against aspiration; may be less suitable for prolonged procedures or when precise ventilation control is needed; requires upper airway patency for exhalation.

Given the persistent neck wound discharge, the decision was made to proceed with surgical repair of the PCF. The patient was planned for a multidisciplinary surgical approach with careful anesthetic management due to his complex medical history.

3. Anesthetic Management

In preparation for surgery, standard (ASA) monitoring was initiated, including pulse oximetry, non-invasive blood

pressure monitoring, and electrocardiography (ECG). Baseline vitals were recorded, and two intravenous lines were

Preoxygenation was performed using a mask placed over the stoma site. A suction catheter was inserted through the stoma to assess airway patency and clear any secretions or obstructions before proceeding with fiberoptic bronchoscopy. The induction of anesthesia was achieved with fentanyl (100 µg), propofol (100 mg), and rocuronium (40 mg) to induce muscle relaxation. After waiting for three minutes, fiberoptic bronchoscopy was performed to evaluate the airway and ensure distal airway patency. A 7.5 mm flexo-metallic endotracheal (ET) tube was carefully advanced through the stoma under direct visualization. (**Figure 1**)

Anesthesia was maintained using a Target-Controlled Infusion (TCI) pump with remifentanil, employing the Minto pharmacokinetic model to optimize dosing. Intraoperative ventilation was managed to maintain normoxia ($SpO_2 > 95\%$) and normocapnia ($EtCO_2$ 35-45 mmHg). Hemodynamic stability was ensured by keeping the mean arterial pressure (MAP) between 65 and 75 mmHg, which was essential considering the patient's history of ischemic heart disease. The intraoperative course remained uneventful, with stable vital signs and no complications.

Neuromuscular blockade was reversed at the end of the procedure with sugammadex (200 mg), and the patient was transferred to the postoperative unit for continued monitoring. Throughout the procedure, infection control measures were meticulously followed, with strict aseptic techniques employed for all wound management.

4. Postoperative Course

The patient was closely monitored in the intensive care unit (ICU) for 24 hours after surgery. Postoperative analgesia was managed with intravenous paracetamol and patient-controlled analgesia (PCA) using morphine. His cardiovascular status remained stable with no episodes of hypotension or arrhythmia. Strict aseptic techniques were followed for wound care, and prophylactic antibiotics were continued to reduce the risk of infection.

A follow-up contrast study on postoperative day 7 confirmed that the fistula had closed successfully, with no leakage of contrast material. The patient was gradually allowed to resume oral intake. By postoperative day 10, the patient was stable enough to be discharged, with scheduled follow-up appointments in both the surgical and anesthesia outpatient clinics.

5. Discussion

The management of anesthesia in patients who have undergone a total laryngectomy presents a unique set of challenges, which are further compounded by the presence of a pharyngocutaneous fistula (PCF) and an unhealed stoma. These patients often have complex medical histories, including comorbidities such as ischemic heart disease, diabetes, and hypertension, and may have received prior radiotherapy, all of which significantly impact perioperative management. The incidence of PCF following laryngectomy varies considerably, ranging from 3% to 65%, highlighting the influence of diverse patient factors and surgical techniques.[1] This report will delve into the critical anesthetic considerations for a 75-year-old male with an unhealed stoma undergoing surgical repair for a PCF, emphasizing airway management, hemodynamic optimization, infection control, and the importance of a multidisciplinary strategy.

The most critical aspect of anesthetic management is ensuring a secure airway. In this case, fiberoptic bronchoscopy was essential for evaluating the airway and facilitating safe intubation. Alternative

techniques, such as awake tracheostomy re-cannulation or jet ventilation, could have been considered but were not required due to the patient's relatively stable airway status, potentially making this more invasive procedure unnecessary as a first-line approach.[4] The decision to proceed with fiberoptic intubation implies a clinical judgment that the existing stoma was likely patent enough for this technique to be successful.

The use of a suction catheter prior to fiberoptic bronchoscopy ensured that the airway was clear of any secretions or obstructions, allowing for a smoother intubation process.[5]

Beyond airway management, careful hemodynamic optimization is paramount in post-laryngectomy patients, especially those with significant comorbidities to prevent perioperative complications.[6] This patient's history of ischemic heart disease, diabetes mellitus, and hypertension necessitates a nuanced anesthetic approach that extends beyond routine hemodynamic monitoring as described in **Table 1**.

The risk of infection is particularly high in post-surgical patients with open stomas, and strict infection control measures were employed in this case to prevent wound contamination.[7] Prophylactic antibiotics were administered, and careful attention was given to aseptic technique during the surgical procedure.[8]

Post-laryngectomy patients can exhibit altered hemodynamic responses due to potential damage to the carotid bodies during radical neck dissection. This denervation can sometimes lead to exaggerated hypertensive responses or unexpected hypotension following anesthesia induction .Continuous arterial line monitoring enabled real-time adjustments in anesthetic management to maintain adequate perfusion and prevent myocardial ischemia.[9]

The use of a TCI pump with remifentanil following the Minto model allowed for stable hemodynamic control with minimal fluctuations in blood pressure and heart rate. Remifentanil, an ultra-short-acting opioid, offers several

advantages in this context. Its rapid onset and offset allow for precise titration of anesthetic depth and analgesia, potentially leading to improved hemodynamic stability compared to longer-acting opioids.[10]

In this case, a multidisciplinary approach involving surgeons, anesthesiologists, and nursing staff was essential to achieve a positive outcome. Effective communication and collaborative planning are crucial for optimizing perioperative care in high-risk patients like this one.

6. Conclusion

The management of post-laryngectomy patients with an unhealed stoma and pharyngocutaneous fistula requires a comprehensive and individualized approach. Advanced airway techniques, careful hemodynamic monitoring, and stringent infection control are crucial for ensuring patient safety and optimizing surgical outcomes. This case highlights the importance of fiberoptic bronchoscopy for secure intubation, the use of remifentanil for stable hemodynamic control, and the necessity of strict infection control measures in such high-risk patients. Future research should focus on refining airway management strategies and developing standardized protocols for managing high-risk post-laryngectomy patients.

7. Source of Funding

None.

8. Conflict of Interest

None.

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