Case Report

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Unexpected Airway Obstruction Following Tracheostomy in a Patient Undergoing Head and Neck Surgery: A Case Report

Anaesthesia Section

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ABSTRACT

Airway management in patients with previous head and neck surgery poses significant challenges owing to anatomical distortion, limited mouth opening, and postoperative tissue changes. We report a case of a 43-year-old male with hypertension, diabetes, and recently diagnosed hypothyroidism who had undergone Wide Local Excision (WLE) with partial mandibulectomy and Pectoralis Major Myocutaneous (PMMC) flap reconstruction three months earlier. Scheduled for resection and Anterolateral Thigh (ALT) flap reconstruction for an ulcer in the buccal region, with a planned tracheostomy, awake fibreoptic nasal intubation was done under dexmedetomidine sedation and lignocaine topicalisation due to restricted temporomandibular joint movement and altered airway anatomy. General Anaesthesia (GA) was maintained with sevoflurane, fentanyl, and rocuronium. At the end of an uneventful surgery, a tracheostomy was performed to protect the airway during the postoperative period. Within minutes, the anaesthesia team detected a sudden loss of capnography, increased airway pressures, and absent chest rise indicative of total airway obstruction. A circuit check revealed no issues, and suctioning the tube did not resolve the issue. Fibreoptic bronchoscopy was done through the tracheostomy tube, which revealed a mucosal fold obstructing the distal end of the tracheostomy tube. The tracheostomy tube was immediately removed, and the patient was reintubated nasally under fibreoptic guidance. Postoperatively, the patient was administered dexamethasone to decrease airway oedema and was shifted to the Intensive Care Unit (ICU) for observation and elective ventilation. Two days later, fibreoptic bronchoscopy indicated a clear airway, and the patient was successfully extubated. This case highlights the importance of vigilant monitoring, prompt recognition, and management of airway obstruction, as well as the critical role of fibreoptic bronchoscopy in managing such complex situations in head and neck reconstructive surgery.

Keywords: Airway management, Difficult intubation, Fibreoptic bronchoscopy, Postoperative complications, Tracheostomy tube obstruction

CASE REPORT

A 43-year-old male, weighing 95 kg and standing 170 cm tall, presented with a non-healing ulcer on the right buccal mucosa for the past 25 days. Computed Body Mass Index (BMI) was 32.9 kg/m^2. He was a known hypertensive for the last six years on Amlodipine 5 mg once daily and diabetic for the last 10 years, managed on an insulin sliding scale. He was diagnosed with hypothyroidism and was on levothyroxine 25 µg daily for the last two weeks. His American Society of Anaesthesiologists (ASA) physical status was graded as III. The patient had undergone a WLE with partial mandibulectomy and PMMC flap reconstruction under GA three months back.

On examination, central obesity with submental fat deposition was present. Mouth opening was approximately 13 mm, and temporomandibular joint movement was severely restricted. The Mallampati classification could not be assessed. Airway assessment revealed a thyromental distance of approximately 5 cm, and limited neck mobility due to postoperative tissue changes, all of which further suggested a potentially difficult airway. Systemic examination was within normal limits. Haemoglobin was 11.5 g/dL, total leucocyte counts 10,500/mm^3, platelet count 268 × 10^3/µL, and renal and liver function tests were normal. The electrocardiogram and echocardiogram were within normal limits.

The patient was scheduled for resection and reconstruction with an ALT flap, with tracheostomy to be done at the end of surgery for postoperative airway protection. Because of a history of restricted mouth opening, previous flap surgery, and distorted anatomy, an awake fibreoptic intubation was planned. In the operating room, standard ASA monitors were attached. Intravenous access was secured with an 18-gauge cannula. The patient was made comfortable and reassured. Intravenous glycopyrrolate 0.2 mg was given to reduce airway secretions. Topical anaesthesia was done with nebulised 4% lignocaine and lignocaine 10% spray to the oropharynx, and 2% lignocaine jelly applied intranasally. Sedation was achieved with a dexmedetomidine infusion, administered as a loading dose of 1 µg /kg over 10 minutes, followed by a maintenance dose of 0.5 µg/kg/h. The airway was further anaesthetised by instilling 2% lignocaine through the bronchoscope's working channel during intubation.

A Fibreoptic Bronchoscope (FOB) was gently advanced through the right nostril, and the glottic structures were viewed. The Endotracheal Tube (ETT) was smoothly inserted over the bronchoscope and fixed after confirmation of bilateral equal air entry to the lungs and an appropriate capnography waveform. Intravenous propofol 150 mg, fentanyl 100 µg, and rocuronium 80 mg were given to induce GA and ensure muscle relaxation. Anaesthesia was maintained with oxygen, air, and sevoflurane, with additional rocuronium doses of 10 mg given intermittently as required.

Following this, resection and ALT flap reconstruction were done uneventfully. Thereafter, a surgical tracheostomy was performed. The patient's SpO_2 at this stage was 99% on controlled ventilation with a tidal volume of 500 mL, respiratory rate of 12/min, FiO_2 0.5, and Positive End-Expiratory Pressure (PEEP) of 5 cm H_2O, with an End-Tidal CO_2 ($ETCO_2$) reading of 36 mmHg and a size 7.0 mm Portex tracheostomy tube was introduced. The ventilator circuit was then attached. Simultaneously, SpO_2 began to fall from 99% to 90%, and $ETCO_2$ tracing disappeared despite unchanged ventilator settings. The anaesthesia team noticed elevated peak pressures, and absent chest rise. The reservoir bag became tight, resulting in a progressive decrease in delivered tidal volumes. Bilateral air entry was absent on auscultation, which suggested complete airway

obstruction. The breathing circuit and tube connections were immediately checked and found to be intact. Manual ventilation was difficult, thereby increasing the suspicion of complete airway obstruction. A bougie was railroaded through the tracheostomy tube in an attempt to relieve the obstruction. However, ventilation could not be restored [Table/Fig-1]. Suction proved ineffective. FOB visualisation through the tracheostomy tube revealed a mucosal-like mass at the distal end of the tracheostomy tube, completely obstructing ventilation [Table/Fig-2]. As ventilation could not be restored despite bougie railroading, the tracheostomy tube was removed and nasal reintubation performed under fibreoptic guidance [Table/Fig-3]. Ventilation was immediately re-established as evidenced by easy bag movement, bilateral chest expansion, and return of a normal capnography trace. Following reintubation, SpO_2 improved to 100% and $ETCO_2$ returned to 35-37 mmHg with normalisation of airway pressures.

[Table/Fig-1]: Bougie being railroaded through the tracheostomy tube to address post-tracheostomy obstruction. Ventilation could not be restored.

[Table/Fig-2]: Post-tracheostomy FOB demonstrating obstruction within the tracheal lumen.

Dexamethasone 8 mg was given intravenously as an anti-oedema measure. The patient was shifted to the ICU with the ETT in situ for elective postoperative ventilation. Assessment with FOB prior to extubation two days later revealed no obstruction or mucosal prolapse. The patient was safely extubated over a tube exchanger under FOB guidance, maintaining adequate spontaneous ventilation and stable haemodynamics. It was later inferred that the earlier obstruction was likely due to the inflated tracheostomy tube cuff

[Table/Fig-3]: Nasal reintubation performed after persistent obstruction despite bougie attempt.

drawing surrounding mucosa or flap tissue into the lumen, resulting in a transient blockage. The postoperative course remained uneventful with no further airway or respiratory complications.

DISCUSSION

Altered airway anatomy in patients undergoing head and neck reconstruction surgery poses a host of challenges, including difficult airway management and a high risk of airway compromise to anaesthesiologists. The distortion of normal airway landmarks due to surgical resections, radiation therapy, flap reconstructions, and scarring from prior procedures can result in complications during intubation and postoperative airway control. Further complicating factors include obesity, limited mouth opening, and restriction of temporomandibular joint mobility. Awake fibreoptic intubation is generally considered one of the most controlled approaches in these patients, as it secures the airway under direct vision while maintaining spontaneous ventilation. The use of adequate topical anaesthesia, antisialagogues, and sedation with agents such as dexmedetomidine has enhanced the comfort and safety of these procedures. Anaesthetic challenges in such cases include an anticipated difficult airway due to distorted anatomy and restricted mouth opening, difficulty in mask ventilation due to obesity and facial contour changes, risk of trauma to reconstructed tissues during instrumentation, potential tube obstruction by oedema or secretions, and the possibility of sudden airway compromise in the perioperative period. In addition, maintaining adequate oxygenation while securing the airway, preventing aspiration, and avoiding hemodynamic instability during airway manipulation are critical concerns [1-3].

Anaesthetic management in these cases extends well beyond securing the airway. Surgical manipulation of the upper aero-digestive tract, along with prolonged operative time and fluid shifts, all predispose to postoperative airway oedema. Preventive measures include head elevation, judicious fluid administration, and corticosteroids such as dexamethasone to reduce tissue swelling and maintain airway patency. Close communication between the anaesthesiologist and surgical team during flap reconstruction is crucial to ensure the optimal positioning of ETT and surgical structures without compression or distortion. In the present case, the risk of postoperative airway compromise was heightened by prior reconstructive surgery and altered airway

anatomy, underscoring the need for meticulous airway planning and vigilance [4,5].

Decisions regarding the need for a tracheostomy or the delay of extubation are generally based on individual circumstances, including the extent of surgery, airway anatomy, and anticipated postoperative oedema. Selective approaches are increasingly replacing routine tracheostomy in many cases. However, when more extensive resections are planned, limited airway access is anticipated, or bulky reconstruction flaps are anticipated, a tracheostomy remains a safe choice. Even a tracheostomy may be complicated by tube obstruction or mucosal prolapse, underscoring the importance of vigilance and readiness for rapid intervention [6]. Reports in the literature highlight several mechanisms of tube obstruction. Farr MJ and Cyna AM described post-extubation airway obstruction caused by a tracheal mucosal flap that required fibreoptic-guided reintubation [7]. At the same time, Goranovic T et al., reported ETT obstruction by a nasal polyp during nasotracheal intubation in an obese trauma patient, demonstrating how unexpected anatomical structures may compromise ventilation [8].

A FOB assessment forms the basis of the primary assessment of the airway, and also of postoperative assessment of airway patency, especially before extubation. It enables the early detection of oedema, mucosal folds, or other anatomical changes that may lead to obstruction. The other important component of safe management is maintaining adequate oxygenation, being ready for reintubation, and having emergency airway equipment available. Preserving flap perfusion is also an important consideration. Undue coughing or bucking, as well as airway obstruction, may threaten vascular anastomoses and thus compromise the flap. Smooth emergence and extubation techniques, often assisted by infusions of short-acting opioids or dexmedetomidine, minimise haemodynamic variability, thereby permitting a gentle recovery. The airway is managed in the postoperative period through continuous observation during the peak time of swelling, typically within the first 48 hours after surgery. Careful monitoring with head-up positioning and appropriate humidification of inspired gases will minimise the risk of airway compromise. Additional safety is afforded by gradual weaning off ventilatory support and leak testing prior to extubation, as well as FOB visualisation in cases of doubt [9-11]. Gupta M et al., reported a case in which unexplained ventilatory difficulty during surgery was eventually attributed to ETT blockage by caseous necrotic material from tuberculosis, which was diagnosed after tube removal and confirmed with fibreoptic bronchoscopy, highlighting the importance of systematically evaluating ventilator, circuit, and tube-related causes of airway obstruction [12].

Alternative anaesthetic strategies that could be considered in such cases include awake tracheostomy, video-laryngoscope-assisted intubation, or elective postoperative ventilation with delayed extubation. Awake tracheostomy may provide a secure airway but is invasive and technically challenging in obese patients with distorted neck anatomy. Video laryngoscopy may improve glottic visualisation but can still be limited in patients with severely restricted mouth opening or altered oropharyngeal anatomy following reconstructive surgery. Elective postoperative ventilation is another option to allow resolution of airway oedema; however, it may prolong ICU stay and increase the risk of ventilator-associated complications. In the present case, awake fibreoptic nasal intubation was preferred as it allowed controlled visualisation of airway structures, minimised trauma to reconstructed tissues, and enabled secure airway establishment while maintaining spontaneous ventilation [1,4,9].

[Table/Fig-4] summarises various reports documenting the management of tube blocks [7,8,12].

Author	Case description and management	Takeaway points
Present case	A 43-year-old male with central obesity, partial mandibulectomy with a PMMC flap, was posted for a redo surgery. During surgery, a surgical tracheostomy was done. The patient developed airway obstruction, which was managed with FOB-assisted nasal intubation.	The high possibility of postoperative oedema in head and neck surgeries requires careful planning and high levels of vigilance. Optimal use of corticosteroids and fluids can prevent these complications. Readiness for reintubation and the establishment of a surgical airway are critical in managing airway obstruction.
Farr MJ and Cyna AM 2006 (Australia) [7]	A 15-year-old female developed stridor and respiratory distress following extubation after being electively ventilated in the ICU following surgery. FOB revealed obstruction of the trachea by a tracheal mucosal flap. She was reintubated under FOB guidance, and the patient recovered uneventfully.	Prompt diagnosis of airway obstruction by flaps is crucial for effective management of post-extubation stridor. FOB enables both diagnosis and precise management of airway obstructions.
Goranovic T et al., 2007 (Croatia) [8]	A 38-year-old obese male was posted for emergency fixation of a broken mandible. Following intubation, an Endotracheal Tube (ETT) obstruction due to a nasal polyp occurred, resulting in ventilation failure. The tube was then placed through the other nostril, and the polyp was resected. The patient had an uneventful recovery.	Being aware of obstruction in the tube lumen is crucial to avoid catastrophe in the operating room, and gentle manual ventilation should be established to prevent pushing the tissue further down. Awareness of intranasal deformities and careful examination are essential in emergency settings to prevent complications.
Gupta M et al., 2017 (India) [12]	A 12-year-old female was undergoing decompression of Pott's spine under General Anaesthesia (GA) when she developed tachycardia, increased peak inspiratory pressure, and end-tidal carbon dioxide. ETT was found to be patent on external inspection. Upon removal, the tube was found blocked with caseous necrotic material from tuberculosis. The patient was re-intubated, and a FOB examination revealed granulomatous material near the carina. The surgery proceeded uneventfully, and the patient made a full recovery.	Anaesthesiologists must be vigilant in identifying causes of airway obstruction and should carefully exclude ventilator, circuit, and ETT issues before considering patient-related sources of resistance. FOB is a valuable diagnostic and therapeutic tool in managing such airway complications.

[Table/Fig-4]: Various case reports documenting management in tube blocks [7,8,12].

CONCLUSION(S)

Airway management during complex head and neck surgeries requires planning and vigilance. Awake fibreoptic intubation can be safely performed in distorted anatomy, provided controlled access to the airway is maintained with spontaneous ventilation. Anti-oedema measures involve gentle tissue handling and judicious fluid management. Other safeguards include continuous monitoring and the facility to urgently reintubate or perform a tracheostomy. This harmonised strategy between the anaesthesia and surgical teams is important in optimising outcomes in these challenging patients.

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