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Case Series

Anaesthesia Section

# Navigating the Dual Challenge of Difficult Airway and Low Cardiac Reserve in Oral Cancer Surgery: A Case Series

SHILPA SARANG KORE[1], DIPTI RANA[2], AMITA VISHAL SALE[3]




## ABSTRACT

Oral cancers, particularly Squamous Cell Carcinomas (SCCs), cause fibrosis and structural changes within the oral cavity, creating complex airway management challenges. These cases often present anaesthetic difficulties, including restricted access for instrumentation, distorted anatomy that increases the difficulty of ventilation and intubation, and a heightened risk of bleeding or airway obstruction. Postoperative concerns, such as airway oedema, respiratory compromise, and pain management, further complicate the perioperative period. This case series explores the anaesthetic management of three patients with oral cancer and significant cardiovascular comorbidities. Two key factors that created anaesthetic challenges were restricted mouth opening of less than 2 cm (less than two finger breadths) and compromised cardiac function, which carries risks of haemodynamic instability and arrhythmias. Awake Fiberoptic Intubation (AFO) was chosen to secure the airway and avoid a situation where ventilation or intubation would be impossible. The nasal cavities were instilled with xylometazoline drops. Additionally, a transtracheal block was performed in the sitting position, using 4 mL of 4% topical lignocaine to anaesthetise the trachea, significantly reducing the cough reflex and discomfort during intubation. Sedation was provided with midazolam and fentanyl after the administration of supplementary oxygen. Fiberoptic intubation was carried out, and the airway was secured by railroading a flexometallic tube over the bronchoscope. Induction was performed with midazolam (0.04 mg/kg), fentanyl (2 mcg/kg), and vecuronium (0.1 mg/kg). Anaesthesia was maintained using sevoflurane, nitrous oxide, and oxygen. Haemodynamic monitoring was conducted with Central Venous Pressure (CVP) and Arterial Blood Pressure (ABP) measurements. The surgical procedure went uneventfully. After surgery, the patients were kept on a T-piece in the Post-Anesthesia Care Unit (PACU) and were closely monitored for airway patency, respiratory effort, and haemodynamic stability. This case series emphasises anesthetic strategies that manage complex airway and cardiovascular issues in high-risk oral cancer surgery while addressing critical postoperative considerations.


**Keywords:** Awake fibreoptic intubation, Cardiac comorbidity, Transtracheal block, Restricted mouth opening

## INTRODUCTION

Oral cancers, particularly Squamous Cell Carcinomas (SCCs), represent a significant subset of head and neck malignancies and often present unique challenges to anaesthesiologists. These tumours typically cause anatomical distortion, tissue fibrosis, trismus, and restricted mouth opening, making airway management particularly complex [1]. The risk of airway obstruction, bleeding, and difficult ventilation or intubation is notably higher in this patient group [2]. In addition to anatomical challenges, many patients with oral cancer are elderly and may have significant systemic comorbidities, including cardiovascular disease. Co-existing cardiac conditions such as coronary artery disease, arrhythmias, and hypertension increase the risk of intraoperative haemodynamic instability, myocardial ischaemia, and arrhythmic events, further complicating anaesthetic management [3,4].

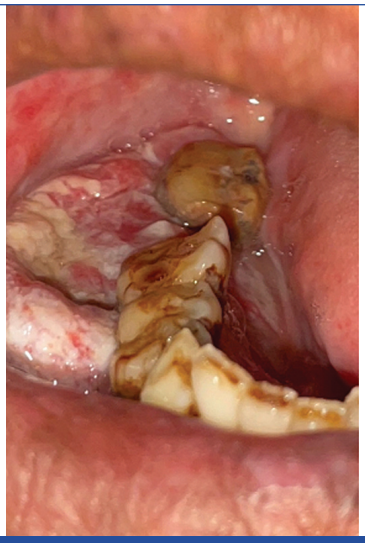
Safe management of difficult airways requires thorough preoperative assessment, multidisciplinary coordination, and advanced planning. Awake Fiberoptic Intubation (AFO) is the gold standard, preserving spontaneous ventilation, minimising risk, and avoiding "cannot intubate, cannot ventilate" scenarios [5,6]. Adjuncts like airway blocks, vasoconstrictors, and conscious sedation enhance success [2,7]. Intraoperative care demands vigilant haemodynamic monitoring, tailored anaesthesia, and cautious fluid management [4,8].

This case series describes the anaesthetic management of three patients with advanced oral malignancies, presenting airway difficulties due to restricted mouth opening and posing a high cardiac risk due to poor functional reserve. The successful use of AFO, regional airway blocks, and intraoperative cardiovascular optimisation is discussed. The series highlights the importance of individualised anaesthetic strategies to safely navigate the dual challenges of airway compromise and cardiovascular instability in high-risk patients.

## CASE SERIES

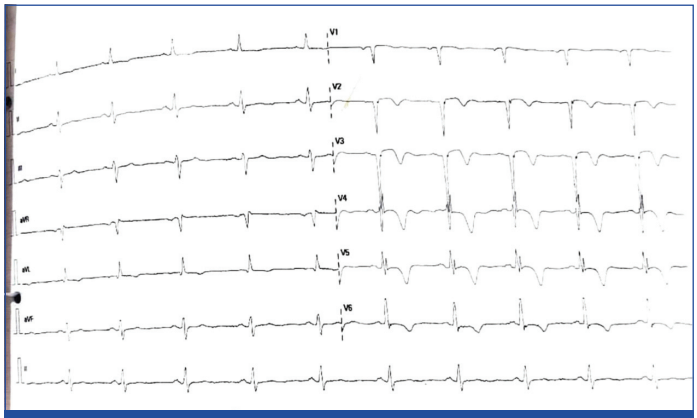
### Case 1

A 65-year-old male chronic tobacco chewer presented with a nonhealing ulcer on the right cheek buccal mucosa for two months, associated with pain, difficulty in chewing, poor oral hygiene, and occasional bleeding. He chewed tobacco five times a day, using one sachet each time for the past 30 years. He was diagnosed with advanced buccal carcinoma and planned for composite resection, as shown in [Table/Fig-1]. The patient had a known history of hypertension for 30 years and was on Tablet Telmisartan 40 mg and Tablet Amlodipine 10 mg. Airway examination revealed restricted mouth opening (MO <2 cm), Mallampatti classification IV, poor dental status, and limited neck extension. Contrast-enhanced computed tomography showed a large lesion involving the right buccal mucosa with infiltration into adjacent soft tissues, narrowing the oropharyngeal airway. A Two-Dimensional (2D) echocardiogram revealed ischemic cardiomyopathy, with a 35% Ejection Fraction (EF), indicating severely reduced left ventricular Regional Wall Motion Abnormality (RWMA), including anterior, anterolateral, anteroseptal hypokinesia, with apical akinesia. Q waves were seen in leads II,



**[Table/Fig-1]:** Lesion in the right buccal mucosa.

III, and aVF along with global T-wave inversions on the patient's Electrocardiogram (ECG) [Table/Fig-2] from two years earlier, indicating a history of myocardial infarction. The chest X-ray showed cardiomegaly and less pulmonary venous congestion, indicating chronic left heart failure [Table/Fig-3]. Preoperative laboratory results showed mild anaemia (haemoglobin 10.8 g/dL). The patient was on furosemide 40 mg, atorvastatin 40 mg/day, aspirin 75 mg/day, and ramipril 5 mg/day to control his heart failure.



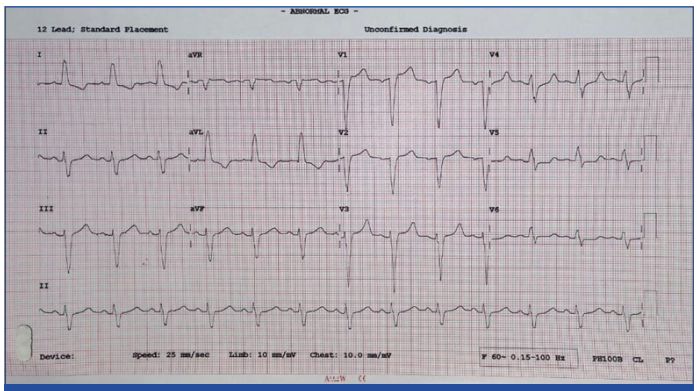

**[Table/Fig-2]:** ECG shows Q waves in II, III and aVf along with global t wave inversions.

**[Table/Fig-3]:** Chest X-Ray (CXR) showing cardiomegaly and pulmonary congestion.

## Case 2

A 50-year-old female presented with a complaint of swelling over the left alveolus associated with pain in the left lower jaw and restricted mouth opening. She reported a history of previous dental surgery, specifically a tooth extraction of the left lower central incisor two months ago. She was diagnosed with Squamous Cell Carcinoma (SCC) of the alveolus and planned for wide local excision and partial bilateral neck dissection, as seen in [Table/Fig-4]. The patient had a known history of hypertension for 20 years and was on Tablet Telmisartan 40 mg and Tablet Amlodipine 10 mg. Airway examination revealed a two-finger mouth opening with a Class IV Mallampati score. Computed Tomography (CT) imaging revealed an exophytic lesion on the anterior two-thirds of the tongue, extending into the floor of the mouth with no significant airway compromise. The 2D echocardiogram showed non-ischemic cardiomyopathy with an EF of 30%, accompanied by mild left ventricular dilation and mild tricuspid regurgitation. An ECG showed sinus tachycardia with a left bundle branch block, which may indicate a problem with the conduction system [Table/Fig-5]. The chest X-ray indicated mild cardiomegaly. The patient was on rosuvastatin 20 mg/day, enalapril 10 mg/day, furosemide 40 mg/day, and metoprolol 25 mg/day. Preoperative laboratory investigations were within normal limits.

**[Table/Fig-4]:** Preoperative image showing lesion, degree of mouth opening.



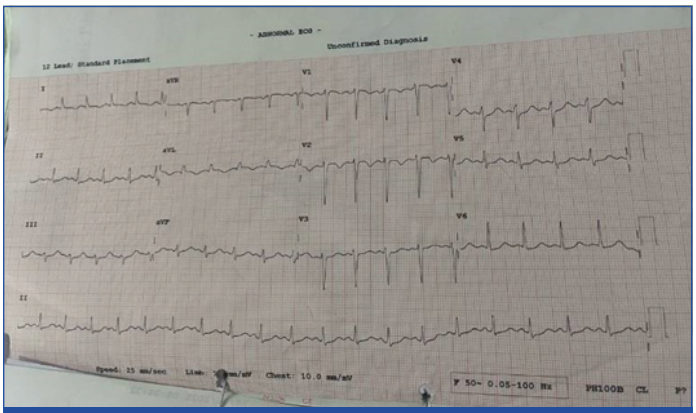

**[Table/Fig-5]:** ECG shows left bundle branch block.

## Case 3

A 58-year-old man with a known case of hypertension presented with complaints of discomfort and swelling in his lower jaw for three months, associated with foul-smelling oral hygiene. He was diagnosed with SCC of the lower gingiva and planned for tumour resection and primary closure, as shown in [Table/Fig-6]. Airway examination revealed a reduced inter-incisor gap of 1.5 cm, restricted jaw mobility, and a Mallampati grade IV view. CT imaging showed a mass involving the lower gingiva with destruction of the mandibular cortex, significant soft-tissue infiltration, and posterior tongue displacement (TNM staging: T2N0M0). He had a history of myocardial infarction eight years ago, for which he was started on bisoprolol 5 mg/day, enalapril 10 mg/day, aspirin 75 mg/day, and atorvastatin 40 mg/day. A 2D echocardiogram revealed anterior wall motion abnormalities, with an EF of 35% and moderate mitral

regurgitation. The ECG showed ST-segment depression in leads V3-V6 [Table/Fig-7]. Preoperative laboratory investigations were within normal limits.

**[Table/Fig-6]:** Image showing the lesion in the lower gingiva.



**[Table/Fig-7]:** ECG shows ST depression in v3-v6.

The above oral cancer patients were scheduled for surgery under general anaesthesia. Written consent was obtained after explaining the high risk of perioperative haemodynamic instability, arrhythmias, myocardial ischaemia, prolonged ventilation, vasopressor support, and PACU stay. Adequate blood and blood products were reserved. A 20G cannula was inserted for intravenous access. Standard monitors were attached, and vital signs were recorded. Glycopyrrolate 0.2 mg was administered intravenously before induction to reduce the dilution of topical drugs. The nasal cavities were instilled with xylometazoline drops. After that, a transtracheal block was performed in the sitting position, using 4 mL of 4% lignocaine to anaesthetise the trachea, significantly reducing the cough reflex and discomfort during intubation. We anaesthetised the most patent nasal cavity with 2 ml of 4% lignocaine in a lying position. Sedation was given with fentanyl 2 mcg/kg and midazolam 0.01 mg/kg after the administration of supplementary oxygen. Fiberoptic intubation was carried out by railroading a flexometallic tube over the bronchoscope [5]. Induction was performed with vecuronium (0.1 mg/kg), midazolam (0.04 mg/kg), and fentanyl (2 mcg/kg). Maintenance was achieved using oxygen, sevoflurane, and air. A right subclavian central venous catheter and a right radial arterial line were placed for haemodynamic monitoring and fluid management. Noradrenaline infusion was used at 0.5 mL/h intermittently during the procedure to support cardiovascular stability. The proposed surgical procedures were successfully performed without complications, and haemodynamic stability was maintained throughout the procedure.

After surgery, patients were reversed with Inj. neostigmine 0.5 mg/kg and Inj. glycopyrrolate 0.008 mg/kg from anaesthesia and shifted to PACU on a T-piece. Close monitoring of the patients' haemodynamics was carefully carried out in the PACU. After confirming hemostasis by the surgeon, nebulisation was given, and proper suctioning was performed, along with optimisation of Arterial Blood Gas (ABG) analysis. All the patients were successfully extubated after 24 hours of the procedure. Intravenous paracetamol (15-20 mg/kg) and fentanyl (1-2 mcg/kg) were administered to manage pain. The patients were then shifted to the general ward for further recovery and monitored for unintended events, such as delayed airway obstruction or infection.

## DISCUSSION

Oral cancer primarily affects the buccal mucosa, tongue, and gingiva, and the necessary treatments often involve extensive surgical procedures and neck dissections [1]. Surgical procedures for oral cancer remain the only viable approach for eliminating cancer. The presence of heart disease necessitates careful preoperative preparations, which involve the thorough evaluation of the patient at multiple time points to ensure the safety of both the airway and the heart. Patients with an EF of less than 40% are more likely to experience complications such as unstable haemodynamics, myocardial ischaemia, and arrhythmias during the perioperative period. Anaesthetic management for patients with oral cancer and reduced EF must be meticulously planned, and close monitoring during the perioperative period is essential to ensure patient safety and optimal outcomes.

Surgeries required for oral cancer are generally elective procedures. Comorbid conditions such as diabetes, thyroid disorders, or renal insufficiency should be managed 2-3 months prior to the planned operation [3]. The progression of oral cancers is often associated with significant anatomical distortion and severe restriction of the mouth, making traditional airway management techniques, such as direct laryngoscopy, extremely challenging, if not impossible. AFO presents a controlled and visual approach to intubation, allowing the anaesthesiologist to navigate the airway with minimal disturbance to the surrounding anatomy, thereby avoiding the "cannot ventilate/cannot intubate" scenario [6].

To utilise AFO for intubation, the attending anaesthesiologists often employ transtracheal blocks and regional anaesthesia techniques to ensure patients do not experience pain during or after the procedure. Using a transtracheal block, performed in a sitting position, 4% lignocaine was applied as an anaesthetic to numb the trachea, resulting in a significant reduction in cough reflex and discomfort during intubation [2]. AFO is often the primary method for maintaining airway patency; however, in the event of complications, tracheostomy serves as a reliable way to secure the airway if difficulties arise during AFO.

The vessel lumen can be thoroughly visualised using high-resolution Optical Coherence Tomography (OCT) tools before and after stent placement, prior to scaffold implantation. Occasionally, patients may experience mild pain sensations due to the endoscope's tip intruding into the nasal cavity or pharynx. To our knowledge, this report presents the first series of case studies involving cancer patients managed with rtCRT. Conscious sedation with midazolam (0.01 mg/kg) was administered after achieving hyperoxia, along with fentanyl (2 mcg/kg). According to standards, patients underwent nasal intubation using tubes measured at 7 mm and 7.5 mm for women and men, respectively. For patients with vascular disorders, the goal was to navigate the entire perioperative period while managing the effects of methylxanthines like theophylline, which can increase heart rate. Patients with impaired left ventricular function face a heightened risk of intraoperative complications such as unstable haemodynamics and arrhythmias [3]. A complete preoperative checkup was necessary, involving collaboration with the cardiology team to identify cardiac risk factors. Patients were on beta-blockers, ACE inhibitors, diuretics, and statins to manage

heart disease [5]. These medications were administered throughout the pre-surgery period to prevent unchecked heart failure during the surgery, thereby minimising the risk of arrhythmias and myocardial ischaemia. Beta-blockers are essential for reducing heart rate and oxygen demand [4]. Additionally, ACE inhibitors and diuretics should be utilised to lower the risk of pulmonary edema [4].

A central venous catheter and radial arterial line were placed in the right subclavian vein and radial artery for monitoring blood circulation and fluid balance. Noradrenaline infusion at 0.5 mL/h was occasionally used to support the patient during the procedure. Sevoflurane was administered at the lowest effective dose to achieve the appropriate level of anaesthesia while maintaining control over the patient's heart rate. Close monitoring of heart rate, blood pressure, and oxygenation was crucial to detect signs of haemodynamic instability in the early stages. Goal-directed fluid management involved monitoring pulse pressure variation intraoperatively to prevent fluid overload and undue stress on the heart. The aim was to maintain an euvolemic state without excessive hydration, adjusting fluid administration according to the patient's cardiovascular status and output.

According to Dash S et al., a 60-year-old man with SCC of the right buccal mucosa and severely restricted mouth opening (Mallampati IV) underwent a staged surgical approach that included wide local excision, segmental mandibulectomy, bilateral modified radical neck dissection, and fibular free-flap reconstruction [9]. Anticipating a difficult airway, an awake fiberoptic nasal intubation was successfully performed using an 8.0 mm flexometallic cuffed tube. Following tumour resection and flap anastomosis, a tracheostomy was performed, and the patient was transferred to the PACU under neuromuscular blockade and sedation. He was weaned from ventilation the next day and discharged by postoperative day 12 without significant complications. This outcome illustrates the benefits of meticulous pre-anaesthetic planning, skilled anaesthetic execution, and cohesive multidisciplinary teamwork.

Reshma D et al., reported a 78-year-old man with SCC of the right lateral tongue and metastatic neck nodes [10]. Airway assessment indicated Mallampati IV with mild mouth opening restriction. Under general anaesthesia, nasotracheal intubation was successfully performed using a video laryngoscope. The surgery included partial glossectomy and modified radical neck dissection. The intraoperative course was uneventful, and the patient was safely extubated with stable postoperative recovery [10].

## CONCLUSION(S)

Anaesthetic management in oral cancer patients with significant cardiovascular comorbidities requires a personalised and multidisciplinary approach. Cardiovascular stability must be optimised preoperatively, with continuous monitoring during surgery. Due to tumour-related anatomical changes, airway challenges often necessitate advanced techniques like AFO and regional blocks. Judicious fluid and medication management helps prevent perioperative complications. With careful planning and vigilance, anaesthesia can be safely administered, ensuring favorable outcomes and reduced morbidity.

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**PARTICULARS OF CONTRIBUTORS:**

1. Professor, Department of Anaesthesia, Dr. D. Y. Patil Medical College and Research Centre, Pune, Maharashtra, India.
2. Resident, Department of Anaesthesia, Dr. D. Y. Patil Medical College and Research Centre, Pune, Maharashtra, India.
3. Associate Professor, Department of Paediatrics, Bharatratna Atal Bihari Vajpayee Medical College and Hospital, Pune, Maharashtra, India.

**NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:**

Dr. Dipti Rana,
Resident, Department of Anaesthesia, Dr. D. Y. Patil Medical College and Research Centre, Pune-411018, Maharashtra, India.
E-mail: drdiptirana06@gmail.com



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