

Awake Fiberoptic Intubation for Anticipated Difficult Airway in Oral Cancer Patients: A Case Series

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Abstract

Background

Airway management in patients with oral cancer is frequently challenging because of tumor-related anatomical distortion, restricted mouth opening, trismus, reduced tongue mobility, previous radiotherapy, and neck fibrosis. Awake fiberoptic intubation (AFOI) is considered the gold standard for managing anticipated difficult airways, as it allows maintenance of spontaneous ventilation while minimizing airway manipulation and the risk of complete airway obstruction. This case series highlights the role of awake fiberoptic intubation in the successful perioperative management of oral cancer patients with anticipated difficult airways.

Case Series

Five patients with biopsy-confirmed oral cancer undergoing major oncological surgery under general anesthesia were included in this case series. All patients had features suggestive of anticipated difficult airway, including severe trismus, restricted mouth opening, distorted upper airway anatomy, high Mallampati grades, or limited cervical spine mobility. Following detailed preoperative airway assessment, awake fiberoptic intubation was performed using adequate airway topicalization with lignocaine and conscious sedation with dexmedetomidine while maintaining spontaneous ventilation. Four patients were successfully intubated on the first attempt, whereas one required a second attempt because of excessive airway secretions. No patient experienced failed intubation, significant oxygen desaturation, aspiration, airway trauma, or the need for emergency surgical airway access. Surgical procedures were completed successfully, and all patients recovered without major perioperative airway-related complications.

Conclusion

Awake fiberoptic intubation remains a safe, reliable, and effective technique for securing the airway in oral cancer patients with anticipated difficult airways. Careful preoperative assessment, meticulous airway preparation, adequate topical anesthesia, appropriate sedation, and adherence to established difficult airway guidelines are essential for successful outcomes. This case series reinforces the importance of maintaining spontaneous ventilation and having experienced personnel and rescue airway equipment readily available to ensure optimal perioperative patient safety.

Keywords: Awake fiberoptic intubation; Anticipated difficult airway; Oral cancer; Difficult airway management; Head and neck surgery; Fiberoptic bronchoscopy;

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Introduction

Oral cancer is one of the most common malignancies affecting the head and neck region, with squamous cell carcinoma accounting for nearly 90% of cases. It remains a significant public health problem, particularly in developing countries, where tobacco use, alcohol consumption, and betel nut chewing are major etiological factors. Surgical excision with or without neck dissection remains the primary treatment modality for most patients, frequently requiring general anesthesia with secure airway management.[1,2]

Airway management in patients with oral cancer is often challenging because of tumor-related distortion of the upper airway anatomy, restricted mouth opening, limited tongue mobility, trismus, edema, previous radiotherapy, and reduced neck movement. These anatomical changes may render conventional direct laryngoscopy difficult or

impossible and increase the risk of failed intubation, hypoxemia, airway trauma, bleeding, and aspiration. Consequently, thorough preoperative airway assessment is essential to identify patients at risk of anticipated difficult airway and to formulate an individualized airway management strategy.[2,3] Clinical airway assessment should include evaluation of mouth opening, Mallampati classification, thyromental distance, sternomental distance, neck mobility, mandibular protrusion, dentition, and the extent of intraoral tumor involvement. Imaging modalities such as computed tomography or magnetic resonance imaging may provide valuable information regarding airway narrowing and tumor extension. Current difficult airway guidelines emphasize the importance of meticulous planning, availability of alternative airway devices, and preparation for emergency

front-of-neck airway access whenever difficult airway management is anticipated.[3,4]

Awake fiberoptic intubation (AFOI) is widely regarded as the gold standard technique for securing the airway in patients with anticipated difficult intubation because it allows maintenance of spontaneous ventilation while minimizing airway manipulation and cervical spine movement. Adequate airway topicalization, judicious sedation, patient cooperation, and operator expertise are critical determinants of successful awake intubation. Compared with intubation after induction of general anesthesia, awake fiberoptic intubation significantly reduces the risk of complete airway obstruction and facilitates continuous neurological and respiratory assessment throughout the procedure.[3,5]

Recent advances in airway management have introduced videolaryngoscopes, optical stylets, flexible video bronchoscopes, and hybrid airway techniques as valuable alternatives in selected patients. Nevertheless, severe trismus, extensive intraoral tumors, distorted anatomy, and restricted oral access continue to make awake fiberoptic intubation the preferred technique in many patients undergoing surgery for oral cancer. Successful airway management requires a multidisciplinary approach involving anesthesiologists, surgeons, and operating room personnel, together with immediate availability of rescue airway equipment.[4,6]

Despite improvements in airway devices and anesthetic techniques, airway management in oral cancer patients remains a major perioperative challenge. Reporting institutional experiences contributes to better understanding of the practical difficulties encountered during awake fiberoptic intubation and highlights strategies that improve patient safety. We present a case series of five patients with oral cancer who underwent successful awake fiberoptic intubation for anticipated difficult airway management, emphasizing preoperative assessment, airway preparation, intubation technique, perioperative management, and clinical outcomes.

Case Series

Case 1

A 58-year-old male (ASA II), a chronic tobacco chewer for 25 years, presented with biopsy-proven squamous cell carcinoma involving the right buccal mucosa and retromolar trigone. He was scheduled for wide local excision with segmental mandibulectomy and modified radical neck dissection. Preoperative airway assessment revealed severe trismus with an inter-incisor distance of 1.5 cm, Mallampati grade IV, restricted tongue protrusion, and limited neck extension secondary to tumor infiltration. Computed tomography demonstrated narrowing of the oropharyngeal airway due to the tumor mass. Considering the anticipated difficult airway, awake fiberoptic intubation was planned. After adequate counseling,

glycopyrrolate (0.2 mg IV) was administered as an antisialagogue, followed by topical anesthesia using 4% lignocaine nebulization and 10% lignocaine spray. Conscious sedation was achieved with dexmedetomidine infusion. A flexible fiberoptic bronchoscope loaded with a 7.5-mm cuffed endotracheal tube was introduced through the nasal route, and the trachea was successfully intubated on the first attempt while maintaining spontaneous ventilation. General anesthesia was subsequently induced, and surgery proceeded uneventfully. The patient was electively ventilated overnight and extubated safely on the first postoperative day without airway-related complications.

Case 2

A 65-year-old female (ASA III) with carcinoma of the tongue was scheduled for hemiglossectomy with bilateral neck dissection. She had a history of hypertension controlled with medication. Airway examination demonstrated Mallampati grade IV, mouth opening of 2 cm, restricted tongue mobility, and reduced thyromental distance. Previous radiotherapy had resulted in fibrosis of the neck with markedly restricted cervical extension. Awake fiberoptic nasotracheal intubation was selected as the primary airway management technique. Following airway topicalization with nebulized and sprayed lignocaine and light sedation using dexmedetomidine, fiberoptic intubation was successfully completed on the first attempt without oxygen desaturation or hemodynamic instability. General anesthesia was induced after confirmation of tube placement. The intraoperative and postoperative periods were uneventful, and the patient was discharged without airway-related complications.

Case 3

A 52-year-old male (ASA II) diagnosed with carcinoma of the floor of the mouth was scheduled for composite resection with flap reconstruction. He had a history of chronic smoking and alcohol consumption. Airway assessment revealed severe trismus with an inter-incisor distance of less than 1 cm, Mallampati grade IV, limited mandibular protrusion, and distorted oral anatomy due to the tumor. Awake nasal fiberoptic intubation was planned because conventional laryngoscopy was considered impossible. Following administration of glycopyrrolate, airway topicalization, and dexmedetomidine sedation, the bronchoscope was advanced carefully through the patent nostril. The vocal cords were visualized with minimal difficulty, and the trachea was intubated successfully on the first attempt. The patient maintained spontaneous ventilation throughout the procedure. Surgery was completed without complications, and postoperative recovery was uneventful.

Case 4

A 60-year-old male (ASA III) with carcinoma involving the left gingivobuccal sulcus was posted

for wide local excision with segmental mandibulectomy. He had diabetes mellitus and chronic obstructive pulmonary disease. Airway examination showed Mallampati grade IV, mouth opening of 1.8 cm, poor dentition, and reduced neck mobility. Because of the anticipated difficult airway and increased risk of airway obstruction after induction of anesthesia, awake fiberoptic intubation was planned. Adequate airway anesthesia was achieved using nebulized lignocaine, transtracheal lignocaine injection, and superior laryngeal nerve block. Conscious sedation was provided with dexmedetomidine. Fiberoptic-guided oral intubation was successfully accomplished on the second attempt because of excessive secretions partially obscuring visualization. Oxygen saturation remained above 96% throughout the procedure. Surgery and postoperative recovery were uneventful, and no airway trauma or neurological complications were observed.

Case 5

A 48-year-old female (ASA II) with squamous cell carcinoma of the hard palate was scheduled for partial maxillectomy with reconstruction. She had no significant medical comorbidities but presented with restricted mouth opening (2 cm), Mallampati grade III, and tumor extension into the posterior oral cavity, making direct laryngoscopy difficult. Awake fiberoptic nasotracheal intubation was performed after adequate counseling, antisialagogue administration, airway topicalization, and dexmedetomidine sedation. The bronchoscope was advanced smoothly, and endotracheal intubation was successfully completed on the first attempt without hypoxemia or airway trauma. General anesthesia was induced after securing the airway. The surgical procedure was completed successfully, and the patient was extubated after confirming complete recovery of airway reflexes. She had an uneventful postoperative course and was discharged in stable condition.

Parameter	Case 1	Case 2	Case 3	Case 4	Case 5
Age/Sex	58/M	65/F	52/M	60/M	48/F
ASA Status	II	III	II	III	II
Diagnoses	Carcinoma right buccal mucosa with	Carcinoma tongue	Carcinoma floor of mouth	Carcinoma left gingivobuccal sulcus	Carcinoma hard palate

	retromolar triangle involvement				
Planned Surgery	Wide local excision + Segmental mandibulectomy + MRND	Hemiglossectomy + Bilateral neck dissection	Composite resection + Flap reconstruction	Wide local excision + Segmental mandibulectomy	Partial maxillectomy + Reconstruction
Airway Assessment	Mallampati IV, mouth opening 1.5 cm, restricted neck extension	Mallampati IV, mouth opening 2 cm, neck fibrosis	Mallampati IV, mouth opening <1 cm, distorted oral cavity	Mallampati IV, mouth opening 1.8 cm, reduced neck mobility	Mallampati III, mouth opening 2 cm, posterior oral cavity tumor
Predicted Difficulty	Severe trismus with airway narrowing	Previous radiotherapy with neck fibrosis	Severe trismus and distorted anatomy	Limited mouth opening with COPD	Restricted mouth opening with tumor extension
Intubation Route	Nasal	Nasal	Nasal	Oral	Nasal
Sedation	Dexmedetomidine	Dexmedetomidine	Dexmedetomidine	Dexmedetomidine	Dexmedetomidine

Airway Topicalization	Nebulized 4% lignocaine + 10% spray	Nebulized + Spray lignocaine	Nebulized + Spray lignocaine	Nebulization + Superior laryngeal nerve block + Trans tracheal block	Nebulized + Spray lignocaine
Fiberoptic Intubation Attempt	First attempt	First attempt	First attempt	Second attempt	First attempt
Intraoperative Complications	None	None	None	Excessive secretions during intubation	None
Postoperative Outcome	Elective overnight ventilation; extubated POD 1	Uneventful recovery	Uneventful recovery	Uneventful recovery	Uneventful recovery
Final Outcome	Successful recovery	Successful recovery	Successful recovery	Successful recovery	Successful recovery

Discussion

Airway management in patients with oral cancer remains one of the most demanding responsibilities for anesthesiologists because tumor-related anatomical distortion frequently complicates mask ventilation, laryngoscopy, and tracheal intubation. Restricted mouth opening, trismus, limited tongue mobility, airway edema, previous radiotherapy, and

neck fibrosis contribute significantly to anticipated difficult airway management. Failure to recognize these challenges may result in failed intubation, hypoxemia, airway trauma, aspiration, or the need for emergency surgical airway access.[1,2]

In the present case series, all five patients had clinical features suggestive of anticipated difficult airway, including severe trismus, restricted mouth opening, high Mallampati grades, distorted oral anatomy, or reduced cervical mobility. Careful preoperative airway assessment enabled early identification of airway difficulty and facilitated individualized airway planning. These findings are consistent with previous reports that emphasize comprehensive airway evaluation as the cornerstone of successful airway management in patients with head and neck malignancies.[2,3]

Awake fiberoptic intubation remains the gold standard technique for securing the airway in patients with anticipated difficult intubation because it preserves spontaneous ventilation while minimizing airway manipulation. Unlike conventional laryngoscopy performed after induction of general anesthesia, awake fiberoptic intubation avoids the risk of complete airway obstruction in patients with distorted upper airway anatomy. In all patients included in this series, spontaneous respiration was maintained throughout the procedure, providing an important safety margin in the event of delayed visualization or difficult tube advancement. Successful first-attempt intubation was achieved in four patients, while one patient required a second attempt because of excessive airway secretions.[3,4]

Adequate airway preparation was an essential factor contributing to the successful outcomes observed in our patients. Administration of glycopyrrolate effectively reduced airway secretions, facilitating bronchoscopic visualization. Topical airway anesthesia using nebulized and sprayed lignocaine, supplemented with superior laryngeal nerve and transtracheal blocks in selected patients, minimized airway reflexes and improved patient comfort. Dexmedetomidine was used for conscious sedation because of its favorable pharmacological profile, producing cooperative sedation with minimal respiratory depression while maintaining spontaneous ventilation and airway reflexes.[3,5]

Recent advances in airway management have expanded the role of videolaryngoscopes and flexible video bronchoscopes in managing difficult airways. Although videolaryngoscopy has improved glottic visualization in many clinical situations, severe trismus, limited oral access, and extensive intraoral tumors continue to restrict its usefulness in many oral cancer patients. Consequently, awake fiberoptic intubation remains the preferred technique in patients with significant airway distortion, particularly when nasal access is feasible and operator expertise is available.[4,6]

Airway management in oral cancer patients requires meticulous planning beyond the choice of intubation technique. A difficult airway cart, suction apparatus, emergency front-of-neck airway equipment, and experienced anesthesia personnel should always be immediately available. Close communication between anesthesiologists and surgeons is equally important, particularly in patients at risk of complete airway obstruction or postoperative airway edema requiring elective ventilation or delayed extubation. In the present series, one patient remained electively ventilated overnight because of anticipated postoperative airway edema, whereas the remaining patients were safely extubated following complete recovery of airway reflexes without respiratory complications.[8-10]

None of the patients in this series experienced failed intubation, severe hypoxemia, aspiration, airway trauma, or emergency tracheostomy. These favorable outcomes reflect the importance of careful patient selection, adequate airway topicalization, maintenance of spontaneous ventilation, availability of advanced airway equipment, and experienced operators. Similar success rates have been reported in previous studies evaluating awake fiberoptic intubation in patients with head and neck cancers and other anticipated difficult airway conditions.[10-15]

The principal limitation of this case series is the small sample size and descriptive design, which limit the generalizability of the findings. Nevertheless, the series demonstrates the practical application of awake fiberoptic intubation across a variety of oral cancer presentations and reinforces its role as a reliable and safe airway management technique in carefully selected patients. Reporting such institutional experiences increases awareness and provides practical guidance for anesthesiologists managing complex oncological airways.

Summary

Awake fiberoptic intubation remains the preferred technique for securing the airway in patients with anticipated difficult airway secondary to oral cancer. This case series describes five patients with oral malignancies who presented with challenging airway characteristics, including severe trismus, restricted mouth opening, distorted upper airway anatomy, limited neck mobility, and previous radiotherapy-induced fibrosis. Comprehensive preoperative airway assessment, meticulous airway preparation, adequate topical anesthesia, and conscious sedation with dexmedetomidine facilitated successful awake fiberoptic intubation in all patients while maintaining spontaneous ventilation. Four patients were successfully intubated on the first attempt, while one patient required a second attempt because of excessive airway secretions. None of the patients experienced failed intubation, significant hypoxemia, aspiration,

airway trauma, or emergency surgical airway intervention. All patients underwent successful surgical procedures and recovered without permanent airway-related complications.

Conclusion

Airway management in patients with oral cancer requires meticulous planning, comprehensive preoperative assessment, and individualized airway management strategies. Awake fiberoptic intubation remains the gold standard for patients with anticipated difficult airways because it allows maintenance of spontaneous ventilation while minimizing airway manipulation and reducing the risk of complete airway obstruction. Adequate airway topicalization, appropriate conscious sedation, operator expertise, and the availability of alternative airway devices and emergency rescue equipment are essential for achieving successful outcomes. The favorable outcomes observed in this case series reinforce that careful preparation, adherence to established difficult airway guidelines, and a multidisciplinary team approach can ensure safe perioperative airway management in oral cancer patients. Increased awareness and continued training in awake fiberoptic intubation are essential to improve patient safety and optimize anesthetic outcomes in this high-risk population.

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