Airway Management Techniques in Oral and Maxillofacial Surgery: Our practice in a Teaching Hospital Northwest Nigeria and Review of Literature.

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ABSTRACT

Background: Airway management following maxillofacial trauma, orofacial abscess and oral tumors is challenging due to deranged anatomy, soft tissue injury, edema of the tongue, associated hemorrhage and limitation of mouth opening. Massive tumors of the jaws often obstruct the airways and airway is also compromised in midfacial fractures. The objective of this study was to present various methods that were used in our Centre to maintain airways in oral and maxillofacial surgery patients.

Methods: This was a descriptive cross-sectional observational study. One hundred patients admitted to Barau Dikko Teaching Hospital for maxillofacial surgery were selected by convenience sampling method. The study spanned from January 2023 to November, 2025. The methods of airway management were grouped into airway management in emergency cases and those for elective surgeries. The demography, diagnosis of the lesions, method of anesthesia, and complications encountered were recorded for each patient. Statistical analysis was performed using SPSS version 23.

Results: Airway management for emergencies cases comprised of tracheostomy (n= 6, 6.0%), endotracheal intubation (oral & nasal) (n= 4, 4.0%), for elective cases endotracheal intubation was done in (n=62, 62.0%) of patients, tracheostomy done for (n=18, 18%) laryngeal mask done for (n=10, 10.0%). Challenges encountered include failed intubation, bleeding, airway sub-tissue, and ineffective paralyzing agent.

Conclusion: Airway management in maxillofacial surgery requires the skill of well-trained anesthesiologist to achieve optimal results. Proper evaluation and planning of the anesthesia methods is necessary for safe surgery.

Keywords: Airway management, maxillofacial surgery, trauma, tumours, anesthesia,

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INTRODUCTION

Airway management in patients undergoing oral and maxillofacial surgery represents one of the most complex and high-risk responsibilities shared by the anesthesiologist and the maxillofacial surgeon. Pathologies affecting the maxillofacial region

including facial skeletal fractures, extensive benign and malignant tumors, deep orofacial infections, and traumatic soft-tissue injuries, frequently distort normal airway anatomy, compromise airway patency, and render conventional airway techniques unreliable or hazardous.[1,2] The challenge is further compounded in low- and middle-income countries (LMICs), where delayed presentation, advanced disease, limited imaging, and restricted access to advanced airway devices are common.

Anatomical derangements such as restricted mouth opening, trismus, tongue elevation, oedema of the floor of the mouth, hemorrhage, and cervical soft-tissue distortion significantly increase the risk of difficult mask ventilation and failed tracheal intubation.[3,4] In emergency scenarios particularly in patients with Ludwig's angina, maxillofacial trauma, or hemorrhagic tumors, the urgency to secure a definitive airway is juxtaposed against suboptimal physiological reserve and incomplete pre-operative assessment, thereby elevating the risk of hypoxia, aspiration, and airway catastrophe.[5]

Pre-operative airway evaluation remains the cornerstone of safe anesthetic planning in this patient population. Established bedside predictors including the Mallampati classification, inter-incisor distance, thyromental distance, mandibular space assessment, and cervical spine mobility provide valuable but imperfect guidance in anticipating airway difficulty.[6,7] Advanced modalities such as fibre-optic bronchoscopy and videolaryngoscopy have transformed difficult airway management in high-resource settings; however, their effectiveness may be limited in maxillofacial pathology by bleeding, secretions, distorted landmarks, and equipment unavailability.[8,9]

Despite the proliferation of airway algorithms and guidelines, including those from the American Society of Anesthesiologists and trauma-focused protocols such as ATLS, there remains no universally optimal airway strategy for maxillofacial surgical patients.[10,11] Decisions regarding oral versus nasal intubation, supraglottic airway use, submental intubation, or surgical airway creation must be individualized, factoring in pathology, surgical requirements, anticipated postoperative airway needs, and institutional expertise.[12]

Notably, data describing real-world airway management practices in maxillofacial surgery within resource-constrained environments remain sparse. Most available literature originates from high-income settings and may not fully capture the clinical realities, constraints, and pragmatic decision-making encountered in LMICs. This study therefore aims to present and critically appraise the airway management techniques employed in patients undergoing oral and maxillofacial surgery at a tertiary teaching hospital in Northwestern Nigeria, highlighting indications, challenges, and outcomes. By contextualizing these findings within the existing body of evidence, this work seeks to contribute locally relevant data and inform safer, adaptable airway strategies for similar settings.

MATERIALS AND METHODS

This was a descriptive cross-sectional observational study. One hundred patients admitted to Barau Dikko Teaching Hospital for maxillofacial surgery were selected by convenience sampling method. The study spanned a period of three years from January 2023 to November, 2025. Patients were classified into two groups, those who needed emergency airway management and those for elective airway management. Data collected for each patient includes: age and sex, diagnosis of the lesions, anesthetic assessment, method of anesthesia used, type of surgery done and airway complications. Patients were selected based on age from 3-months to 85-years, this to allow for quick assessment of the airway. Lesions were classified into three groups: orofacial benign and malignant tumors, fractures of facial skeleton, cysts of the floor of the mouth and orofacial infections. Profile forms were filled for each patient that participated in the study. Patients' consents were obtained for the study.

The data obtained were analyzed using statistical package for social sciences (IBM SPSS) version. Frequency statistics and cross tabulations were done and the chi-squared test was used to test for significance between variables at the critical $P<0.05$. Ethical approval was obtained from the hospital medical ethical committee. Statistical analysis was performed using SPSS version 23.

RESULTS

More males participated in the study more than female at the ratio of 1.27: 1.00 (Table 1). More patients in their third and fourth decade of life participated in the study (Table 1). Tumours of the mandible were the most encountered (n=24, 24.00%) in this study (Table 2). Ankylosis of the Temporo-Mandibular Joints (TMJ) consisted of 9 cases, and all were operated under tracheostomy (Table 2). Ludwig's angina and neck tumours were

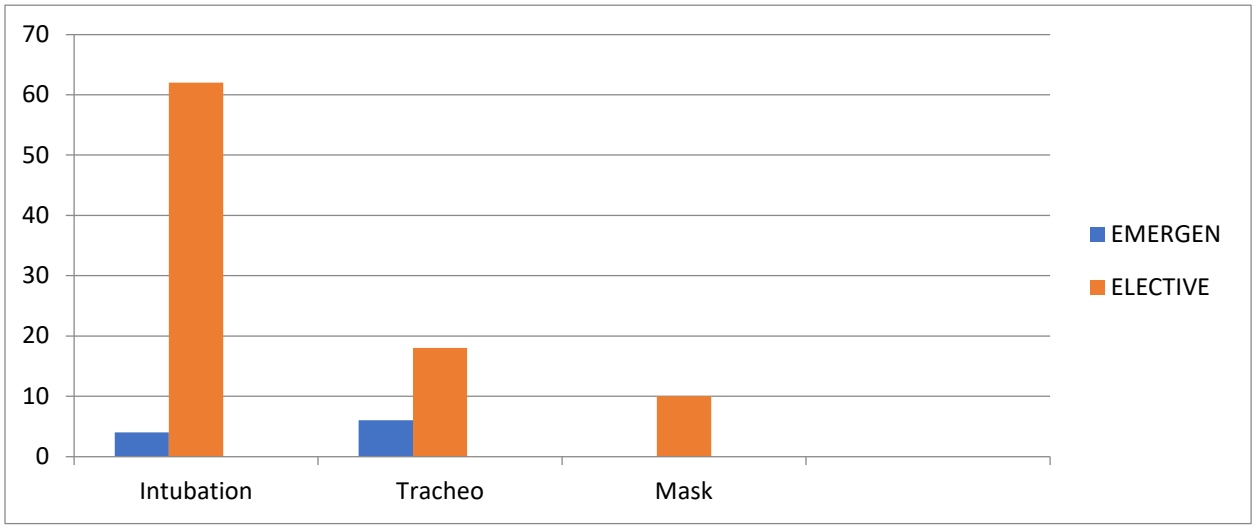
the least case reported (n=4, 4.00%) (Table 2). Airway management for emergencies cases comprised of tracheostomy (n= 6, 6.0%), endotracheal intubation (oral & nasal) (n= 4, 4.0%), for elective cases endotracheal intubation was done in (n=62, 62.0%) of patients, laryngeal mask done for n=10, 10.0%), tracheostomy (n=18, 18%) (Figure 1). Challenges encountered include failed intubation, bleeding, ineffective paralyzing agent and patient condition such as neck swelling in Ludwig's angina patients which made emergency tracheostomy difficult and even impossible in few cases.

Table 1. Demography of 100-Maxillofacial Surgical Patients.

Age range (years)	Sex		Total	Percentage
	Male	Female		
0 – 20	11	8	19	19.0
21 - 40	17	12	29	29.0
41 - 60	23	14	37	37.0
61 – 80	3	6	9	9.0
≥ 81	2	4	6	6.0
Total	56	44	100	100.0

Table 2: Frequency Distribution of maxillofacial lesions among 100-Patients

S/No	Diagnosis	Sex		Total	Percentage
		Male	Female		
1.	Fractures of the facial bones	8	9	17	17.0
2.	Neck Tumour	4	0	4	4.0
3.	Ludwigs Angina	3	1	4	4.0
4.	Parotid gland tumours	6	3	9	9.0
5.	Mandibular tumours	14	10	24	24.0
6.	Maxillary tumours	7	5	12	12.0
7.	TMJ Ankylosis	3	6	9	9.0
8.	Palatal tumours	6	5	11	11.0
9.	Sublingual Dermoid cyst	5	5	10	10.0
Total		56	44	100	100.0



NOTE: Emergen represent emergency airway, while elective represents elective airway. Intubation means both oral and nasal intubation, Tracheo means tracheostomy, mask means laryngeal mask.

Figure 1: Airway Control Methods in 100-Maxillofacial Patients.

DISCUSSION

Securing and maintaining a safe airway in patients with maxillofacial pathology remains a defining determinant of peri-operative outcomes. The method of anaesthesia in maxillofacial surgery is not determined by sex, or age of the individual but by the nature of the lesion, and the surgical procedure that the patient required. All age groups were involved in this study as long as surgery is required as treatment for the lesion (Table 1). The lesions reported in this study determined the mode of anaesthesia used. All TMJ ankylosis (9%) in this study required surgical access to the airway (Table 2 & Figure 1). Massive tumours of the mandible and maxillae obstructed the oral airway such that nasal nor oral intubation could not be done except tracheostomy was done to access and maintain the airway (Table 2 & Figure 1).

In this study, endotracheal intubation predominantly via direct laryngoscopy emerged as the most frequently utilized airway technique, particularly in elective surgical cases, while tracheostomy was more commonly required in cannot intubate, cannot ventilate" cases (Figure 1). These findings align with existing literature identifying tracheal intubation and surgical airway access as the only truly definitive airway modalities.[13]

The high success rate of conventional direct laryngoscopy observed in this cohort underscores the enduring relevance of fundamental airway skills, particularly in environments where advanced airway adjuncts are unavailable. Similar observations have been reported by Saini et al.[2] and Langeron et al.[14] who emphasised that experienced operators can achieve acceptable intubation success even in anatomically distorted airways, provided meticulous preparation and contingency planning are in place. However, the challenges encountered in this study including failed intubation, obscured laryngeal views due to bleeding, and inadequate neuromuscular blockade—reflect well-documented risk factors for airway failure in maxillofacial surgery.[15]

Emergency cases, especially those involving Ludwig's angina and rapidly expanding hemorrhagic tumors, frequently necessitated tracheostomy. Notably, neck swelling, loss of anatomical landmarks, and limited cervical extension rendered emergency tracheostomy technically demanding in many of our patients. Comparable difficulties have been reported in trauma-focused studies, where emergent surgical airways are associated with higher complication rates than elective procedures.[16,17] Despite these risks, early recourse to tracheostomy in selected patients may avert catastrophic 'cannot intubate, cannot ventilate' scenarios, a principle strongly supported by closed-claims analyses and national airway audits.[18] This study recorded remarkable success in tracheostomy use, to secure airway in such scenarios.

Supraglottic airway devices (SADs), particularly the laryngeal mask airway, were employed in a limited subset of patients undergoing short-duration procedures when endotracheal intubation proved unsuccessful. While SADs are widely advocated as rescue devices in difficult airway algorithms, their role in maxillofacial surgery remains adjunctive rather than definitive.[19,20] The restricted oral aperture and potential for displacement during surgical manipulation limit their applicability, findings that are consistent with prior reports.[21] Nevertheless, their utility as a temporary ventilatory bridge was evident in this study.

Advanced airway techniques such as fibre-optic intubation and videolaryngoscopy were not utilized due to equipment constraints. Although these modalities are recommended in anticipated difficult airways, their effectiveness in maxillofacial trauma is often compromised by blood, secretions, and disrupted anatomy.[22,23] The absence of these technologies in many LMIC centres underscores the need for robust proficiency in basic airway techniques and early surgical airway decision-making.

Submental intubation, proposed as an alternative to tracheostomy in selected maxillofacial trauma patients, was not performed in this series. While previous studies have demonstrated its utility in avoiding tracheostomy-related morbidity, the technique requires specific expertise and carries risks including nerve injury, infection, and salivary fistula formation.[24,25] Its omission in this cohort reflects pragmatic practice in a setting where simplicity, speed, and safety are prioritized.

Postoperative airway vigilance remains critical in maxillofacial surgery. Delayed airway compromise due to oedema, bleeding, or hematoma formation is well recognized, justifying the strategy of delayed extubation in high-risk patients.[26] The emphasis placed in this study on maintaining airway protection beyond the operating theatre aligns with international best practice and reinforces the concept that airway management is a continuum rather than a discrete intra-operative event. Majority of our patient were not extubated until they were fully awake, there were cases of severe bleeding post

operatively were the tongue, floor of the mouth and the face were swollen, but the endotracheal tube in-situ preserved the airway till the swelling subsided. This study therefore recommended delayed extubation in maxillofacial surgical patients.

Overall, the findings of this study reinforce the need for thorough pre-operative assessment, anticipatory planning, and multidisciplinary collaboration in maxillofacial airway management. While technological advances continue to expand the airway armamentarium, the realities of resource-limited settings necessitate adaptable, skill-based approaches grounded in sound clinical judgement. Future multi-centre studies from similar environments would be valuable in refining context-specific airway algorithms and improving patient safety across diverse healthcare systems.

CONCLUSION

Airway management in oral and maxillofacial surgery is a high-risk undertaking, particularly in patients with anatomically distorted airways due to trauma, tumors, or deep orofacial infections. This study shows that, even in resource-limited settings, safe and effective airway control is achievable through thorough pre-operative assessment, appropriate technique selection, and close anesthetist–surgeon collaboration. Conventional endotracheal intubation remains effective in elective cases, while tracheostomy is often indispensable in emergencies and advanced disease. Ultimately, successful airway management depends not on a single technique but on anticipatory planning, technical proficiency, and readiness for surgical airway intervention to optimize patient safety and outcomes, especially in low- and middle-income settings.

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Nil.

Conflict of Interest

None declared

REFERENCES

1. Muayad M, Al-Khafaji R, Makki H, Haider H, Abbas F, Menon A. Airway management in head and neck pathology. In: Advances in Otolaryngology. IntechOpen; 2021. doi:10.5772/intechopen.94498. Accessed 12 Jan 2026.
2. Saini S, Singhal S, Prakash S. Airway management in maxillofacial trauma. J Anaesthesiol Clin Pharmacol. 2021; 37(3):319–327. doi:10.4103/joacp.JOACP_315_19.
3. Weaver JM. Challenges of airway management. Anesth Prog. 2018; 65(1):56–57. doi:10.2344/anpr-65-03.
4. Mandana DP, Qualls S, Rokos I. Emergency airway management in penetrating neck injury. Ann Emerg Med. 2000; 35(3):221–225. doi:10.1016/S0196-0644(00)70071-0.
5. Oliveira J, Maia N, Gonçalves J, Almeida V. Airway management for penetrating neck trauma: a case report. Cureus. 2023; 15(10):e33441. doi:10.7759/cureus.33441.
6. Roth D, Pace NL, Lee A, Hovhannisyan K, Warenits AM, Arrich J, et al. Airway physical examination tests for detection of difficult airway management in apparently normal adult patients. Cochrane Database Syst Rev. 2018; (5):CD008874.doi:10.1002/14651858.CD008874.pub2.
7. Phero JC, Rosenberg MB, Giovannitti JA. Adult airway evaluation in oral surgery. Oral Maxillofac Surg Clin North Am. 2013;25(3):385-399. doi:10.1016/j.coms.2013.04.005.
8. Helm M, Gries A, Mutzbauer T. Surgical approaches in difficult airway management. Best Pract Res Clin Anaesthesiol. 2005;19(4):623–640. doi:10.1016/j.bpa.2005.06.002.
9. Kill C, Risse J, Wallot P, Seidl P, Steinfeldt T, Wulf H. Videolaryngoscopy reduces cervical spine movement. J Emerg Med. 2013;44(4):750=756. doi:10.1016/j.jemermed.2012.07.080.
10. Apfelbaum JL, Hagberg CA, Caplan RA, Blitt CD, Connis RT, Nickinovich DG, et al. Practice guidelines for management of the difficult airway. Anesthesiology. 2013; 118(2):251–270. doi:10.1097/ALN.0b013e31827773b2.
11. Committee on Trauma. Advanced Trauma Life Support (ATLS) Student Course Manual. 8th ed. Chicago: American College of Surgeons; 2008.
12. Timothy A, Watkins O, Opie NJ, Norman A. Airway choices in maxillofacial trauma. Trends Anaesth Crit Care 2011; 1:179–190. doi:10.1016/j.tacc.2011.03.005.
13. Mort TC. Complications of tracheal intubation: immediate airway-related consequences. J Intensive Care Med. 2007; 22(4):208–215. doi:10.1177/0885066607301359.
14. Langeron O, Birenbaum A, Amour J. Airway management in trauma. Minerva Anestesiol. 2009;75(5):307–311.

15. Mechlin MW, Hurford WE. Emergency tracheal intubation: techniques and outcomes. Respir Care 2014; 59(6):881–894.doi:10.4187/respcare.02851.
16. Dillon JK, Christensen B, Fairbanks T, Jurkovich G, Moe KS. The emergent surgical airway: cricothyrotomy versus tracheotomy. Int J Oral Maxillofac Surg. 2013; 42(2):204–208. doi:10.1016/j.ijom.2012.10.021.
17. Gupta P, Modrykamien A. Fatal tension pneumothorax and subcutaneous emphysema after open surgical tracheostomy. J Intensive Care Med. 2014; 29(5):298–301. doi:10.1177/0885066613486739.
18. Peterson GN, Domino KB, Caplan RA, Posner KL, Lee LA, Cheney FW. Management of the difficult airway: a closed claims analysis. Anesthesiology. 2005;103(1):33–39.doi:10.1097/00000542200507000-00009.
19. Wong DT, Yang JJ, Mak HY, Jagannathan N. Use of intubation introducers through a supraglottic airway. Can J Anaesth. 2012; 59(7):704–715. doi:10.1007/s12630-012-9714-8.
20. DuCanto J, Serrano KD, Thompson RJ. Suction-assisted laryngoscopy and airway decontamination. West J Emerg Med. 2017; 18(1):117–120. doi:10.5811/westjem.2016.10.31862.
21. Piepho T, Thierbach A, Werner C. Nasotracheal intubation: look before you leap. Br J Anaesth. 2005; 94(6):859–860. doi:10.1093/bja/aei147.
22. Loh PS, Ng KW. Combining videolaryngoscopy and fibre-optic bronchoscopy. J Anaesthesiol Clin Pharmacol 2017; 33(2):254–255. doi:10.4103/joacp.JOACP_206_16.
23. Cook TM, Woodall N, Frerk C. Major complications of airway management in the UK. Br J Anaesth. 2011; 106(5):617–631. doi:10.1093/bja/aer058.
24. Hernández Altemir F. The submental route for endotracheal intubation. J Maxillofac Surg. 1986; 14:64–65. doi:10.1016/S0301-0503(86)80227-9.
25. Schutz P, Hamed HH. Submental intubation versus tracheostomy in maxillofacial trauma. J Oral Maxillofac Surg. 2008; 6(7):1404–1409. doi:10.1016/j.joms.2007.12.027.
26. de Toledo GL, Bueno SC, Mesquita RA, Amaral MBF. Complications from submental endotracheal intubation. Dent Traumatol. 2013; 29(3):197–202. doi:10.1111/edt.12032.