



Original

# Tracheostomy in Oral and Maxillofacial Surgery: Indications and techniques

Oluleke OO

**Omisakin Olatunde Oluleke** *Dental/Maxillofacial unit, Department of surgery, Kaduna state university, Kaduna; omisakinolatunde@gmail.com; +2348039553854*

Article history: Received 17 May 2024, Reviewed 14 June 2024, Accepted for publication 22 June 2024

## Abstract

**Background:** Tracheostomy as a common surgical procedure in maxillofacial surgery is indicated in difficult intubation, severe orofacial infections, neoplasms, traumatic respiratory obstruction and congenital orofacial malformations. Study reviewed the indications and techniques used for tracheostomy in maxillofacial surgical patients in a teaching hospital.

**Method:** This was a retrospective study of the clinical aspects, treatment methods, and clinical course of 54 patients who underwent tracheostomies by a consultant in the Dental/Maxillofacial Clinic of Barau Dikko Teaching Hospital, between January, 2010 and April, 2024. Data collected from the accident and emergency, theatre and outpatient clinic registers, included patient age, clinical diagnosis, indications for tracheostomy, surgical procedures performed and complications.

**Result:** 54 patients had tracheostomy as elective and emergency surgeries during the period. Male to female ratio was 1.25: 1.00. Commonest indications was ankylosis of the temporomandibular joints (n=16, 29.63%), then massive tumors of the mandible (n= 12, 22.22%); panfacial fractures was the least (n=2, 3.70%). Elective surgeries (n=45, 83.33%) were the commonest interventions. Unilateral and bilateral condylectomies were the commonest procedures done (n=12, 22.22%). Intraoperative complications include bleeding and paratracheal placement of tube. Postoperative complications include blockage of tube with secretions and blood clot; subcutaneous surgical emphysema was significant in few patients after closure of the tracheostomy site. No patient had tracheal stenosis and the wound healed satisfactorily.

**Conclusion:** The standardized surgical technique presented here reduces the associated surgical risk. Maxillofacial surgeons need to be proficient in tracheostomy. Good knowledge of anatomy of important structures and handling them correctly greatly reduces complications.

**Keywords:** Tracheostomy, maxillofacial, surgery, indications, techniques, airway.



This is an open access journal and articles are distributed under the terms of the Creative Commons Attribution License (Attribution, Non-Commercial, ShareAlike” 4.0) - (CC BY-NC-SA 4.0) that allows others to share the work with an acknowledgement of the work's authorship and initial publication in this journal.

## How to cite this article:

Omisakin OO. Tracheostomy in Oral and Maxillofacial Surgery: Indications and techniques. *The Nigerian Health Journal* 2024; 24(2):1327 - 1332. <https://doi.org/10.60787/tnhj.v24i2.833>



## Introduction

One of the major challenges in the management of patients with complex oral and maxillofacial procedures is in the maintenance of airway.<sup>1</sup> In patients with massive oral tumors, Ludwig's angina, faciomaxillary trauma and temporomandibular ankylosis; several factors influence the management of airway in these disease conditions, these factors include: proximity of the tumor to the airway, adequacy of mouth opening, and also the nature of surgical procedures involved. Ability to manage the airway properly would determine the outcomes of the treatment and hence, the recovery of the patient.

There are many studies in the literature<sup>2-6</sup> comparing the outcome of elective and emergency tracheostomies. Majority concluded that elective tracheostomy as better surgical outcome. There is a lot of controversy in the management of airway during the immediate postoperative period in maxillofacial surgical operations, the issue is the length of time after operation for which the removal of endotracheal tubes and tracheostomy tubes should be done to be safe for the patients.

Tracheostomy was recommended by the American Academy of Otolaryngology to be one of the effective methods to manage the airway in major head and neck surgeries.<sup>3</sup>

Tracheostomy is however associated with appreciable morbidity, with reported complication rates of 8-45%.<sup>4-6</sup> The complications are bleeding, injury to adjacent structures, surgical emphysema, pneumothorax, or pneumomediastinum, blockage of the tracheostomy cannula, displacement of the cannula, tracheitis, cellulitis, pulmonary atelectasis, tracheoinnominate fistula, trachea-oesophageal fistula, tracheocutaneous fistula, tracheomalacia, granulation, excessive scarring, and failure to decannulate.<sup>5-7</sup>

However, for complex maxillofacial surgical cases most of the clinicians have been practicing alternatives to tracheostomy such as submental intubation, laryngeal mask airway, fibre-optic bronchoscopy, and video laryngoscope.<sup>5-8</sup> Moreover, only endotracheal intubation and tracheostomy are considered definitive.<sup>7</sup> Surgical creation of an airway is a safe method for securing the airway when the procedure is performed by an experienced surgeon.<sup>7</sup>

The aim of the present study was to retrospectively review the indications, techniques and complications of tracheostomies done in our study Centre. This article presents a simplified tracheostomy procedure based on anatomic markers that gives the best compromise

between invasiveness and safety. Also, to review the utility of elective and emergency tracheostomy in oral and maxillofacial surgery.

## Method

This was a retrospective study of 54 patients who underwent tracheostomies performed by a consultant in the Dental/Maxillofacial Clinic of Barau Dikko Teaching Hospital, Kaduna, Nigeria. This study was done between January, 2010 and April, 2024 and only patients that underwent tracheostomy during this period were included in the study. Information was collected from the accident and emergency register, theatre register, ward register and outpatient clinic register. Information collected includes: patient age, clinical diagnosis, indications for tracheostomy, complications and period after surgery when extubation of the tube was done. All patients who underwent tracheostomy both for elective and emergency purposes were included. The patients had major intraoral tumor resections, condylectomies, surgical decompression, reduction and immobilization of the fractures and excisions of tongue tumor. Ethical clearance was obtained from the hospital ethical committee and proper consent was taken.

## Results

54 patients had tracheostomy for elective surgeries and emergency conditions during the period of study. Males were 30 and females 24, at ratio of 1.25: 1.00. (Table 1) Ankylosis of the temporomandibular joints was the commonest indication (n=16, 29.63%) then massive tumors of the mandible (n= 12, 22.22%); panfacial fractures was the least (n=2, 3.70%) (Table 2). Elective surgeries (n=45, 83.33%) were the commonest indication, while emergencies accounted for (n= 9, 16.66%). Condylectomies both unilateral and bilateral were the commonest procedures done (n=12, 22.22%) (Table 3). Intraoperative complications include: bleeding and paratracheal placement of tube, postoperative complications include: blockage of the tube with secretions and blood clot, and subcutaneous surgical emphysema occurred after closure of the tracheostomy surgical opening; no wound dehiscence was noticed. None of our patients had tracheal stenosis. Extubation was done 24-48 hours in 45 patients, while 9 patients retained the tube for more 3 days to 7 days after surgery (Figure 1). Acceptable clinical healing and outcomes were obtained in all the patients.

**Procedure of tracheostomy:** Patients were assessed for fitness for surgery, once the patient was fit for surgery, the surgeon performed tracheostomy prior to the surgery under all aseptic precautions either under local anesthesia or general anesthesia with or without sedation after

obtaining informed consent from the patients. Anesthesiologists monitored the vital signs while the procedures were being done.

Patient was positioned in supine position with full extension of the head and neck by placing a shoulder pad or sandbag under the patient's shoulders. Neck and head was positioned in the midline which would bring the cervical trachea forward in the neck and more tracheal rings were accessible in the neck. After preparing and draping the area, a horizontal neck incision midway between the second and third tracheal rings was made using surgical blade.

Furthermore, the incision was deepened in midline cutting both the layers of cervical fascia (superficial and deep layers) including subcutaneous fat.

Dissection was carried out with a curved hemostat, strictly in the midline. The midline raphe present between two sets of strap muscles on either side of neck was dissected. Retractors were used to retract the strap muscles on either side. The thyroid isthmus was now exposed and retracted upwards to expose the 2<sup>nd</sup> and 3<sup>rd</sup> tracheal rings. The pretracheal fascia was incised and the tracheal rings were exposed as shown. Next a syringe loaded with local anaesthesia was inserted into the trachea and aspirated and checked for air bubbles, taking care not to pierce the posterior wall of trachea. Lignocaine was instilled into tracheal lumen to anaesthetize the mucosa and prevent vasovagal attack. A Bjork flap was marked and taken on the anterior wall of trachea.

The opening made to the trachea was further dilated with a tracheal dilator following which tracheostomy was inserted with the help of an obturator or guide. After removal of these, the position of the tube was confirmed by airblast and auscultation of chest bilaterally. Tracheostomy tube was fixed in place with 3-0 silk to the skin of the neck. The cuffed portex tube was inflated. The dressing was done.

Proper care of the tracheostomy and airway was taken. Suction through the tube was done every two hours with instillation of diluted sodium bicarbonate before suctioning.

A sterile catheter or nasogastric tube of 1/3<sup>rd</sup> diameter of tracheostomy tube was used with sterile gloves for suctioning every time. The size of the catheter tube must be 1/3<sup>rd</sup> the inner diameter of tracheostomy tube. Over the opening of the tracheostomy tube, single moist gauze was placed at all times to help in humidification of air entering the lower respiratory tract.

Tracheostomy dressing was changed every day.

The following variables were recorded: age and sex of the patient, diagnosis/indications for surgery, types of operations, time of extubation of the patient and complications.

**Table 1:** Age and sex of patients that underwent tracheostomy

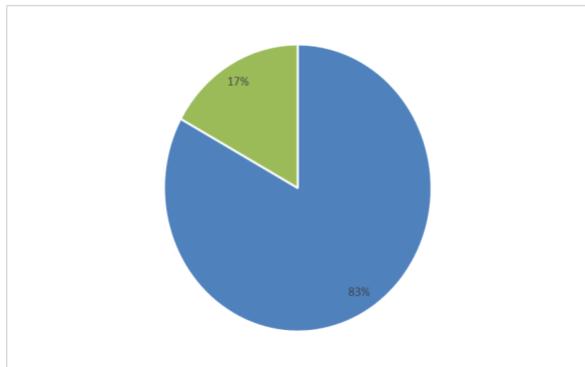
Age/Yrs	Sex		Total	Percent (%)
	M	F		
≤10yrs	3	1	4	9.4
11-20yrs	5	2	7	13.0
21-30yrs	10	8	18	33.3
31-40yrs	5	3	8	14.8
41-50yrs	2	4	6	11.1
51-60yrs	2	1	3	5.6
>60yrs	3	5	8	14.8
	<b>30</b>	<b>24</b>	<b>54</b>	<b>100.0</b>

**Table 2:** Diagnosis of disease conditions/ indications for tracheostomy

Diagnosis	No of patients	Percent
TMJ Ankylosis	16	29.63
Tumor of mandible	12	22.22
Tumor of maxillae	7	12.96
Panfacial fractures	2	3.70
Sublingual tumor	3	5.56
Tongue tumor	4	7.41
Ludwig's Angina	5	9.26
Palatal tumor	5	9.26
<b>Total</b>	<b>54</b>	<b>100.00</b>

**Table 3:** Types of operations

Operations	No of patients	Percent
Condylectomies	12	22.22
Angle Osteotomies	3	5.56
C-shaped osteotomy	1	1.85
Mandibulectomies	12	22.22
Maxillectomies	7	12.96
R & I for fractures	2	3.70
I & D/Decompression	5	9.26
Excision of sublingual cyst	3	5.56
Excision of tongue Tumor	4	7.41
Excision of palatal tumor	5	9.26
<b>Total</b>	<b>54</b>	<b>100.00</b>



**Figure 1:** Time postoperatively when extubation was done

**Note:** Blue (n= 45, 83%) represent extubation done within 24 - 48hours post-operative.

Green (n= 9, 17%) represent extubation done after 3 to 7 days after tube insertion

Surgical subcutaneous emphysema was the commonest complication we reported followed by blockage of the tube from secretion and blood clot. There was no mortality due to tracheostomy from any of our patients.



**Figure 2:** A 70 years old man with tracheostomy tube in place connected to anesthetic machine

### Discussion

Maxillofacial surgical patients are mostly healthy individuals except few with malignancies that have resulted in deterioration of their health and few with significant comorbid conditions. Surgery being the mainstay of treatment for most of the oral tumors, ankylosis of the temporomandibular joint and rapidly spreading orofacial infections. There is need to have a well secured airway before the commencement of surgery. The oral cavity and the nasal cavity are the routes of endotracheal intubation for administration of general

anesthesia to these patients. However, these routes could be inaccessible to the anesthesiologist, because orofacial tumors sometimes block the oral cavity and the nasal cavity. This necessitates the need to seek for alternative access to the bronchial tree. Tracheostomy provides the safe alternative to the broncho-pulmonary tree. Airway management is crucial for any surgery and especially for patients undergoing maxillofacial operations<sup>4</sup>. Maxillofacial surgical procedures such as tumor ablative surgeries, treatments of panfacial fractures, treatment of TMJ ankylosis are major surgical exercises wherein airway and support ventilation of patient is an important component in the appropriate management of immediate postoperative period.<sup>9</sup> Oral and maxillofacial diseases affects all age groups, it could present as congenital malformation, benign or malignant tumors, and fractures of facial bones. These disease conditions often times obstruct the airways. This study reported 54 patients that underwent tracheostomy for various surgical conditions which include: Ludwig's angina where there were obvious respiratory embarrassment and the need to create alternate airway for the patients, massive jaws tumors and tongue tumors made nasal and oral intubation impossible, therefore tracheostomy was done for the patients before tumor resection. Tracheostomy was done for patients with temporomandibular joint ankylosis to create alternate pathway for anesthesia administration.

Tracheostomy could be done safely in all age groups, as this study showed successful procedure in children less than 10 years and adults greater than 60 years. Various maxillofacial surgical procedures such as tumor ablative surgeries, release of temporomandibular ankylosis and surgical drainage of orofacial abscess were done successfully after tracheostomy had stabilize the patient's airway.

Moreover, forty-seven elective tracheostomy was done in this study while seven emergency tracheostomy was done to relief obstructions to the airway such in middle third fractures of the maxillae, and Ludwig's angina that have spread to the neck and anterior chest wall. Ankylosis of the TMJ accounted for most of the elective tracheostomy done in this study because our Centre lacks Fibre optic laryngoscopy which could have reduced the need for this procedure.

One potential argument for the continued use of elective tracheostomy is that patient can be cared for in a ward, which means there is no need for a bed in Intensive Care Unit. It was established in the past that it was acceptable that with tracheostomy patients could be managed in the ward.<sup>10</sup> Majority of our patients were admitted into the

hospital wards, except two that were managed in Intensive Care Unit for 5days. There could be morbidities associated with tracheostomy which include: surgical emphysema, tracheal stenosis, wound dehiscence and chest infection. Also there could be mortality from tracheostomy when the tube is inserted into pretracheal space and when the patient could not be lied in a prone position. Surgical emphysema was a common complication recorded in 10 patients in this study and there was a mortality in one patient with neck abscess.

The process of weaning the patients off the tracheostomy depend on the purpose of insertion. In this study extubation was done for 83% of our patients within 24 to 48 hours after surgery while 17% waited till 3 to 7 days. Those that had delay were the ones with Ludwig's angina as there was need for good drainage of the abscess and good clearance of the airway before tube removal.

Moreover, one could also state that tracheostomy also offers improved patient care, makes surgery in the head and neck convenient for the surgeons and anesthesiologist.<sup>9,10</sup> Nurses trained in management of tracheostomy are needed in the wards for effective suctioning of the tubes. Our overall assessment from this study is that tracheostomy is a safe and lifesaving procedure which every surgeon must be proficient in it.

#### ***Implications from the findings in this study***

Hospital policy makers should design a well-prepared guidelines for the practice of tracheostomy in the hospitals and future research should focus on prospective study on this topic for a more comprehensive report.

#### ***Strength and Limitations***

The data for this study was collected retrospectively and was based on what was recorded, which may not give all details needed, but the quality of note keeping was high and the information required was available in the notes.

#### **Conclusions**

Conventional open tracheostomy is associated with a low complication rate, is safe, efficient in maintaining the airways in complex maxillofacial surgeries. In our procedure there was no loss of airway control for greater than 20 sec, no airway obstruction, limited blood loss and no aspiration, perioperative mortality and postoperative complications. Tracheostomy even though an invasive procedure, when used properly in selected patients can be safe and beneficial to the patients.

#### **Declarations**

***Ethical Consideration:*** Ethical approval was received for the hospital ethical committee

***Conflict of interest:*** Author declared no conflict of interest

***Funding:*** Research was self-funded

***Acknowledgment:*** Author is grateful to all staff of anaesthesia department of our hospital for their support in all the surgical procedures that necessitated tracheostomy.

#### **References**

1. Gysin C, Dulguerov P, Guyot JP, Perneger TV, Abajo B, Chevrolet JC. Percutaneous versus surgical tracheostomy. *Ann Surg.* 1999; 230 (5): 78-79.
2. Crosher R, Baldie C, Mitchell R. Selective use of tracheostomy in surgery for head and neck cancer: An audit. *Br J oral Maxillofac Surg.* 1997; 35:43-45.
3. Casting B, Telfar M, Avery BS. Complication of tracheostomy in major head and neck cancer surgery: A retrospective study of 60 consecutive cases. *Br J oral Maxillofac Surg.* 1994:32:3-5.
4. Halfpenny W, McGurck M. Analysis of Tracheostomy-associated morbidity after operations for head and neck cancer. *Br J Oral Maxillofac Surg.* 2000; 38:509-12.
5. Barak M, Bahouth H, Leiser Y, El-Naaj I. Airway management of the patient with maxillofacial trauma: Review of the literature and suggested clinical approach. *Biomed Res Int* 2015; doi: 10.1155/2015/724032.
6. MittalG, Mittal RK, Katyal S, Uppal S, Mittal V. Airway management in maxillofacial trauma: do we really need tracheostomy? Submental intubation. *J Can Clin Diag Res* 2014; 8(3): 77-79.
7. Anehosur VS, Karadiguddi P, Joshi VK, Lakkundi BC, Ghosh R et al. Elective tracheostomy in head and surgery; our experience. *J Clin Diagn Res* 2017; 11(5): ZC36-ZC39.
8. Waldron J, Padgham ND, Hurley SE. Complications of emergency and elective tracheostomy: A retrospective study of 150 consecutive cases. *Ann R Coll Surg Engl.* 1990;72: 218-220.
9. Aicher S, Givol N, Peleg M, Ardekian L. Changing Indications for tracheostomy in Maxillofacial trauma. *J Oral Maxillafac Surg.* 1996; 54: 292-96.



10. Scutz P, Hamed H. Submental Intubation versus tracheostomy in maxillofacial trauma patients. *J Oral Maxillofac Surg.* 2008; 66:1404-09.
11. Ong SK, Morton RP, Kolbe J, Whitlock RM, McIvor NP, Pulmonary complications following major head and neck surgery with tracheostomy: A prospective randomized, controlled trial of prophylactic antibiotics. *Arch Otolaryngol Head Neck Surg.* 2004; 130:1084-87.
12. Phero JC, Rosenberg MB, Giovannitti JA. Adult airway evaluation in oral surgery. *Oral Maxillofac Surg Clin North Am.* 2013; 25: 385-899.
13. Kenan PD. Complications associated with tracheostomy: prevention and treatment. *Otolaryngol Clin North Am.* 1979; 12: 807 -816