https://doi.org/10.5272/jimab.2018243.2142

Journal of IMAB
ISSN: 1312-773X
https://www.journal-imab-bg.org

Journal of IMAB - *Annual Proceeding (Scientific Papers).* 2018 Jul-Sep;24(3)

Original article

OPEN TRACHEOSTOMY IN ORAL AND MAXILLOFACIAL SURGERY IN A RESOURCE LIMITED SETTING: THE HOPE OF WHOM LITTLE IS GIVEN.

Rowland Agbara[1,2], Benjamin Fomete[2], Obiadazie Athanasius-Chukwudi[2], Omeje Uchenna-Kelvin[3], Onyebuchi Polycarp[2], Idowu Enoch Abiodun[1].

1) Department of Dentistry, Faculty of Medical Sciences, University of Jos, Plateau state, Nigeria.

2) Department of Oral and Maxillofacial Surgery, Ahmadu Bello University Teaching Hospital, Shika-Zaria, Kaduna state, Nigeria.

3) Department of Dental and Maxillofacial Surgery, Aminu Kano University Teaching Hospital, Kano, Nigeria.

ABSTRACT

Purpose: Despite advances in anesthetic techniques, health resource environment still face challenges in achieving safe anesthesia due to limited facilities and skilled personnel. This study highlights the value of open tracheostomy in oral/maxillofacial surgery in a health resource-limited setting.

Materials and Methods: Maxillofacial surgery patients who had a tracheostomy in a regional University Teaching Hospital between February 1999 and August 2017 were retrospectively studied. Details sourced included age, sex, surgical condition, indication for tracheostomy and complications. Data were analyzed using Statistical Package for Social Sciences (SPSS) version 16 (SPSS Inc., Chicago, IL, USA). Findings from descriptive statistics were represented in the form of tables and charts.

Results: A total of 51 patients had an open tracheostomy and this consisted of 28 (54.9%) males and 23 (45.1%) females. The main anesthetic indication was preoperative difficult airway assessment, and there was more elective (n=45; 88.2%) than emergency tracheostomies. Orofacial tumors (n=30; 58.9%) were the major conditions managed. More patients with mallampati class IV (n=18; 69.2%) had tracheostomy. About 98.0% (n=50) of the patients had a temporary tracheostomy and the main complications noted were mortality, surgical emphysema and hemorrhage.

Conclusion: In resource limited environments, the maxillofacial surgical team frequently has little facility to work with and often face challenging cases. Although these patients can be safely anaesthetized using less invasive methods in health resource-rich settings, tracheostomy offers surgeons in our environment an opportunity to improve the quality of life of these patients who otherwise cannot be safely anaesthetized due to limited facilities or skilled manpower.

Keywords: Tracheostomy, Maxillofacial, Tumor, Health resources,

INTRODUCTION

In relation to the airway, oral and maxillofacial pathologies may partially/completely obstruct it, or there may be a distortion of its normal anatomy through displacement, resulting in poor visualization of the airway tract for safe endotracheal intubation. A difficult airway has been defined as one in which a trained anaesthesiologist encounters difficulty in ventilating a patient using a facemask or tracheal tube and represents a complex interaction between patient factors, the clinical setting, and the skills of the practitioner [1]. The incidence has been estimated to be 4.4% and 2.5% for facemask and endotracheal intubation respectively [2]. Predictors of a difficult airway include limited mouth opening, short thyromental distance (< 6 cm), prominent or protruding maxillary incisors, limited neck extension, higher modified Mallampati classification, and grade III and IV Cormack-Lehane laryngoscopic views. However, assessment using combined predictors such as the intubation difficulty scale [3], and the multivariate airway risk index [4] has been shown to greatly reduce the false-negative rate associated with individual predictors [5].

In oral and maxillofacial surgery, the use of direct laryngoscopy usually allows for airway maintenance in uncomplicated cases via nasotracheal or orotracheal intubation. However, in complicated cases, direct laryngoscopy for endotracheal intubation may be difficult and could be associated with increased morbidity and mortality. These complicated cases are encountered in extensive maxillofacial fractures, giant orofacial tumours, massive cervicofacial infections such as Ludwig's angina, congenital anomalies such as Down's and Treacher Collins syndromes, and in conditions associated with limited mouth opening such as temporomandibular joint ankylosis.

Tracheostomy is one of the oldest surgical procedures that involve placement of an artificial airway in the subglottic region temporarily or permanently to allow for efficient airway management. It may be performed as an

emergent, urgent or elective procedure although elective tracheostomy is less frequently performed in developed societies due to advancement in anesthetic technique [6]. Tracheostomy may also be performed using percutaneous or open surgical technique. The percutaneous technique which may be ultrasound or endoscopically assisted is said to be faster, safer, and a less invasive method of placing tracheostomy tubes in ventilated patients [7]. The advantages of tracheostomy include decrease in ventilatory dead space and airway resistance, greater ease of suctioning, increased patient mobility, reduction in orolabial and laryngeal trauma, provision of overall patient comfort, reduction in requirement for sedation, increased ability for the patient to communicate, and variable capacity for oral intake of nutrition and medication [8]. This retrospective study highlights our experience with and the value of open tracheostomy in oral/maxillofacial surgery in a regional university teaching hospital.

MATERIALS AND METHODS

Oral and Maxillofacial Surgical patients, who had tracheostomy done for treatment of their surgical conditions at a regional university teaching hospital between February 1999 and August 2017, were retrospectively studied. Information was sourced from patient case notes and operating theatre records. Patients whose case notes could not be traced were excluded. Details sourced included age, sex, surgical condition, indication for tracheostomy, type of tracheostomy, Mallampati classification, and complications. Data retrieved was analyzed using Statistical Package for Social Sciences (SPSS) version 16 (SPSS Inc., Chicago, IL, USA). Findings from descriptive statistics were represented in the form of tables and charts.

1 Surgical procedure

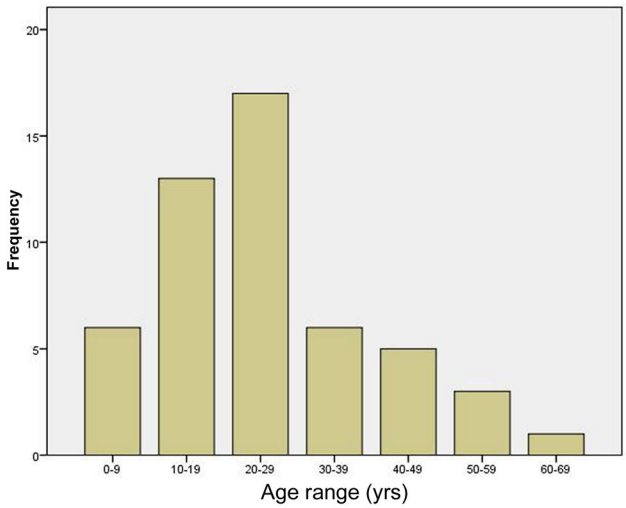
Open Tracheostomies were performed under local anesthesia plus conscious sedation or under general anesthesia (without an endotracheal tube in situ). With the patient in a supine position and the neck in an extended position (following placement of sandbag behind the upper shoulder in most cases), a transverse incision measuring about 4cm long is made two finger breadths above the suprasternal notch. The incision extends from skin to the subcutaneous layer, and then sharp dissection is made through the platysma in the midline along the long axis of the neck until the strap muscles of the anterior neck are encountered. Once the strap muscles are encountered, they are parted from the midline laterally, and blunt dissection continued in the midline of the trachea with control of hemostasis where necessary. Regular palpation is made over the underlying structures to ensure that dissection is over the trachea. In most cases, we did not encounter the isthmus of the thyroid. Once the trachea has been reached, confirmation is made by palpating the structure (the trachea is composed of tracheal rings and thus not a smooth structure), color assessment and by air aspiration using a hypodermic syringe. Following confirmation and with anesthetist informed, the trachea is incised between the 2-4 tracheal rings and the tracheostomy tube (or improvised endotracheal tube) placed. We use the U-shaped or transverse tracheal incisions in our centre.

RESULTS

1. Sex and Age distribution

A total of 51 patients had open surgical tracheostomy within the years reviewed, and this consisted of 28 (54.9%) males and 23 (45.1%) females, giving a male to female ratio of 1.2:1. The age of patients ranged from 2 to 60 years with a mean of 24.3 ± 14.0 years, and 34 (66.7%) of these cases were an adult while the remaining 17 (33.3%) were pediatric cases. The 20-29 year age group (Fig. 1) accounted for the highest number of patients (n=17; 33.3%) followed by the 10-19 year age group (n=13; 25.5%).

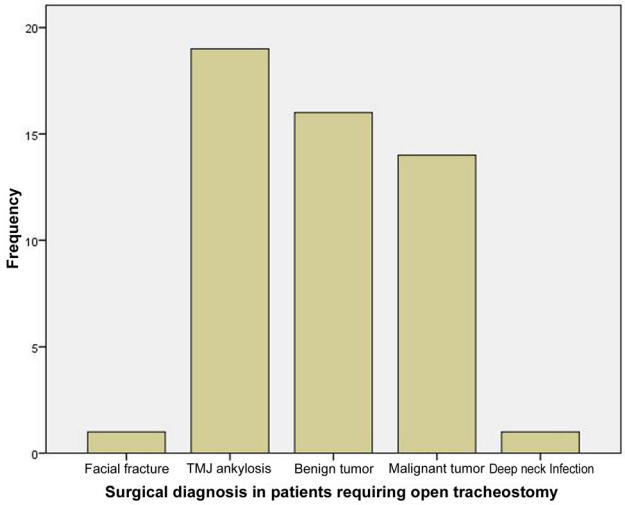
Fig. 1. Age range of patients tracheotomised.



2. Diagnosis, Indication and Type of tracheostomy

Of the 51 tracheotomised patients reviewed, oral/maxillofacial surgeons performed 49 tracheostomies while the remaining 2 procedures were performed by ENT surgeons. The most frequent surgical condition requiring tracheostomy was orofacial tumor (n=30; 58.9%) followed by temporomandibular joint (TMJ) ankylosis (n=19; 37.3%) (Fig. 2). There were more elective (n=45; 88.2%) than emergency (n=6; 11.8%) tracheostomies. The only indication for elective tracheostomy was preoperative difficult airway assessment, while the indications for emergency tracheostomies were airway compromise following failed endotracheal intubation (n=1; 2.0%), accidental endotracheal tube extubation intraperatvely (n=2; 3.9%), immediate postoperative airway complications (n=1; 2.0%), and airway obstruction (n=2; 3.9%) following cervicofacial cellulitis and nasopharyngeal carcinoma respectively.

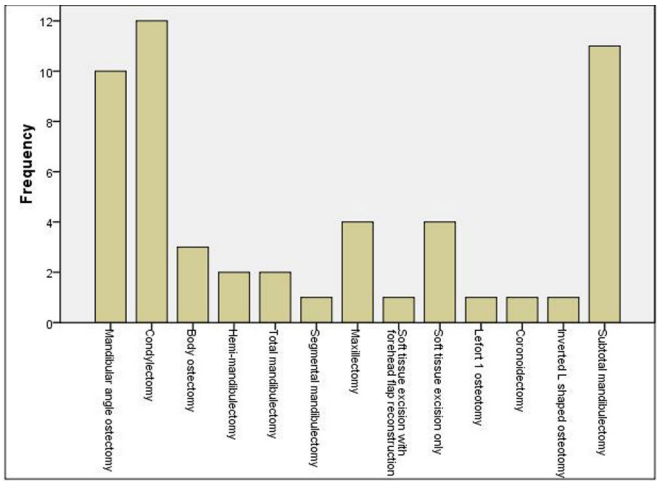
Fig. 2. Presenting surgical conditions in patients tracheotomised.



3. Mallampati classification, Cadre of surgeon and Surgical procedures

The mallampati classification was documented in 26 (60.5%) of the 51 patients reviewed, and of these, mallampati class IV (n=18; 69.2%) had the highest frequency, followed by mallampati class II (n=4; 15.4%) and III (n=4; 15.4%). Analysis of the cadre of surgeons who performed open tracheostomies showed that senior registrars performed 23 (45.1%) tracheostomies while consultants performed 28 (54.9%) tracheostomies. The oral/maxillofacial surgical procedures performed under tracheostomy are shown in figure 3. Condylectomy (n=12; 23.5%) and Subtotal mandibulectomy (n=11; 21.6%) were the most common surgeries.

Fig. 3. Surgical procedures performed on tracheotomised patients.



4. Duration of tracheostomy tube retention, hospital stay and outcome

There were 50 temporary tracheostomies and 1 permanent tracheostomy. The duration of tracheostomy tube retention prior to decannulation was documented in 12 patients and ranged from intraoperative to 7 days postoperative period (Table 1). The duration of hospital stay as documented in 14 of the patients ranged from 10-54 days with a mean of 25.8 ± 12.8. Complications noted in patients studied included surgical emphysema of the neck and upper anterior chest wall (n=2), hemorrhage from the trachea stoma (n=1) and mortality in 5 patients (1 elective and 4 emergent cases).

Table 1. Tracheostomy tube cannulation time

Cannulation Time	Frequency	Percent
Intraoperatively	3	23.1
2 days Postop	1	7.7
4 days Postop	1	7.7
5 days Postop	2	15.4
6 days Postop	1	7.7
7 days Postop	4	30.8
Permanent	1	7.7
Total	13	100.0

DISCUSSION

Tracheostomy is one of the oldest surgical procedures performed by different surgical specialties and involves placement of an artificial airway in the subglottic region temporarily or permanently to allow for efficient airway management. In this retrospective analysis, there were slightly more males than females who underwent tracheostomy. This finding is similar to previous studies [9-11]. The sex distribution of patients undergoing tracheostomy appears to be determined by the surgical or medical indication. For example, conditions such as trauma and head/neck tumors are more common in males. Similarly, a high female to male ratio was reported in a study where hair dye poisoning accounted for 50% of cases seen and with females constituting about 92.5% of the patients [12]. The religious and cultural practices of the study population also influence the sex distribution [13].

Most of the patients in this study were adults with the 20-29yr age group accounting for the highest number of cases, similar to a previous study [11]. However, other studies recorded a higher incidence of tracheostomy in the 0-9yr age group [13, 14]. Orofacial tumors were the main surgical condition requiring tracheostomy, and this finding is similar to previous studies [9, 10, 15]. Orofacial tumors may grow to huge sizes leading to inadequate visualization of the airway for safe endotracheal intubation. This is especially true in resource-limited environments where as a result of poverty, cultural and religious beliefs patient often present late (Fig. 4). In some cases of huge and highly hemorrhagic orofacial tumors, endotracheal intubation may be possible but at the risk of provoking se-

vere bleeding. Therefore, tracheostomy may be a safer option, especially where adequate and proper anesthetic facilities are lacking. Prophylactic tracheostomy may be required in some cases of orofacial tumor surgery such as tongue resection and reconstruction due to the risk of obstructive postoperative edema. This will allow for adequate and uneventful postoperative recovery especially where leaving conventional endotracheal tube may not be ideal.

Fig. 4. Delayed presentation of the orofacial tumor.

Fig. 5. Improvised tracheostomy tube using the conventional endotracheal tube.

The main anesthetic indication for tracheostomy in this study was preoperative difficult airway assessment. Difficult airway remains a challenge in patients with massive orofacial tumors or limited mouth opening from TMJ ankylosis (both of which accounted for a high proportion of the patients studied). In anticipated difficult airway, both non invasive and invasive options for safe anesthesia exist. Non invasive options available for the management of a difficult airway as outlined in the updated report by the American Society of Anesthesiologists task force on management of the difficult airway include awake intubation, video-assisted laryngoscopy, intubating stylets or tube-changers, supraglottic airway anesthesia (SGA) for ventilation (*e.g.*, laryngeal mask airway, laryngeal tube), SGA for intubation (*e.g.*, intubating laryngeal mask airway), rigid laryngoscopic blades of varying design and size, fiberoptic-guided intubation, and lighted stylets or light wands [1]. Invasive techniques available for management of a difficult airway include cricothyroidotomy, retrograde intubation using a guide wire, and tracheostomy [16]. Each of these options has its advantages and disadvantages. Facemask techniques enable the delivery of both oxygen and anesthetic gases/vapors to the patient and are widely used for both induction and maintenance of general anesthesia. However, prolonged positive pressure ventilation with facemask may lead to gastric insufflations. Similarly, it is associated with difficult ventilation in certain patients such as an obese and edentulous patient, and the airway remains unprotected from tracheal aspiration which is undesirable in most oral and maxillofacial surgical procedures. Blind nasal intubation has the advantage of achieving rapid intubation whilst avoiding the pressor response of rigid instrumentation which is observed with direct laryngoscopy. Also, the risk of trauma to teeth which may occur with direct laryngoscopy is eliminated [17]. In addition, it does not require the availability of special or high tech devices, nor is it affected by the presence of blood or secretions [18, 19]. However, it requires skill for success, it is associated with risk of trauma to operator's finger from patient teeth in blind oral intubation, and it is contraindicated in patients with conditions such as base of skull fracture, bleeding disorders, nasal polyps, nasal stenosis, severe laryngeal trauma, and in the presence of foreign body in the upper airway to avoid further downward displacement [20]. Indirect laryngoscopy provides a non-line-of-sight view of the glottis aperture and involves the use of an optical stylet, rigid laryngoscopes and flexible laryngoscopes (which may be video or non-video laryngoscopes). Advantages include faster intubation time, elimination of the need for a line-of-sight view of the glottis aperture, require the use of less force in comparison to direct laryngoscopy and thus reduces trauma to dentition and soft tissues, produces less cervical movement and have a faster learning curve [21, 22]. Cricothyroidotomy and tracheostomy are the two acceptable emergency surgical airways in the 'cannot intubate, cannot ventilate' scenario outlined in the American Society of Anesthesiologists difficult airway algorithm. Cricothyroidotomy (which may be a cannula or surgical cricothyroidotomy) is less invasive when the cannula technique is used, instrumentation needed is easily available, and both inspiration and expiration are possible through the endotracheal tube with surgical cricothyroidotomy. Suctioning, sealing of the airway by the cuff to prevent aspiration, and adequate ventilation/carbon dioxide removal is not feasible with cannula cricothyroidotomy. Despite the stated advantages of cricothyroidotomy such as ease of learning, the absence of intervening tissues in the path of dissection and its safety, most emergency airway establishment is still

achieved using tracheostomy. Cricothyroidotomy for long-term access is safe in only a highly selected population of patients, and absolute contraindications should be observed [23, 24].

All the patients reviewed in this study had an open tracheostomy, and this was performed mainly in the operating theatre with only a single case of tracheostomy performed on the dental chair. One of the predictors of a difficult airway is the Mallampati score although its predictive value when used alone is low. In this retrospective analysis, patients with Mallampati class IV accounted for the highest number of cases requiring a tracheostomy. Previous studies did not indicate the mallampati score or other scoring systems.

More elective than emergency tracheostomies were recorded in this study and this is in agreement with previous studies [15, 25]. However, other studies reported a higher incidence of emergency tracheostomies [6, 11]. The major indication for tracheostomy and the referral pattern appear to influence the type of tracheostomy performed. In our study, the main indication was anticipated preoperative difficult airway whereas it was airway obstruction in studies that reported a higher incidence of emergency tracheostomies. Furthermore, in contrast to a previous report [15], the maxillofacial surgery department in our center performs tracheostomy primarily on its patients undergoing surgery and not on patients being treated by other departments. The latter cases are handled by the otorhinolaryngology department, and this may have contributed to the lower rate of emergency tracheostomies recorded. However, emergency tracheostomy was indicated in six of the cases as a result of "can't intubate, can't ventilate" situation with increasing hypoxaemia. In two of these cases, emergency tracheostomy was done following accidental extubation (of the previously placed tube using fibreoptic laryngoscopy) during surgery. Attempt at reintubation using fibreoptic laryngoscope was not successful. This highlights the need for maxillofacial and other surgeons involved in head and neck surgery to be proficient in this surgical procedure and be ever ready during surgery to perform one if the need arises. Presently, proficiency in tracheostomy by surgical residents is a departmental priority in our center, and surgical residents performed 45.1% of tracheostomies reviewed in this study. Tracheostomy has been found to be a safe and simple technique for surgical residents especially if correct anatomic markers are used, and important structures are recognized and handled appropriately [10].

The major oral/maxillofacial surgical procedure performed on tracheotomised patients in this study was mandibular ostectomy, and this was commonly for TMJ ankylosis. The range of surgical procedures performed would not have been possible without tracheostomy due to our health resource-limited setting, and patient's quality of life would have been low, or their surgical condition may have resulted in further morbidity or mortality. A number of oral and maxillofacial surgical patients who can be safely intubated using other methods other than tracheostomy in health resource-rich environments may end up been tracheotomised in health resource-limited environments. Even where facilities such as fibreoptic laryngoscope exist, the lack of skilled manpower still results in the use of tracheostomy electively.

Although standard tracheostomy tubes are available in our environment, in cases of emergency tracheostomy, these tubes may not be handy to use. The surgeon, therefore, must learn to improvise in securing a safe route for adequate ventilation. In this study, the conventional endotracheal tube was used temporarily in two of the cases and subsequently replaced with conventional tracheostomy tube later (Fig.5).

The duration of tracheostomy tube cannulation is variable and depends on objective quantitative and semi-quantitative factors such as tolerance to tube capping, cough effectiveness, age, ability to swallow, airway patency and the initial indication [26]. Tracheostomy cannulation time was poorly documented in this study (11 cases) and ranged from immediate postoperative period to 7 days postoperative period, similar to a report [9]. However, this is lower than some previous findings [11, 27], and this may be related to the fact that most of the patients in our study were tracheotomised for non-obstructive reasons and thus had no need for prolonged cannulation postoperatively. The benefits of early decannulation include early restoration of respiratory physiology, restoration of speech and swallowing and reduction in the risk of complications such as supraglottic stenosis and tracheomalacia [28]. It has been established [29] that the use of multidisciplinary tracheostomy teams involving speech pathologist, physiotherapist and nursing staff reduces the cannulation time. A multidisciplinary tracheostomy team is currently not available in our center although this is desireable since management of tracheotomised patients during the harmattan season is often challenging due to the production of a thick tenacious mucous from exposure to a dry and dusty northeasterly trade wind.

The length of hospital stay in tracheotomised patients is variable and is dependent on the timing of tracheostomy, primary pathology and availability of multidisciplinary tracheostomy team among other factors [11, 29]. In this study, the mean length of hospital stay in fourteen of the patients was 25.8 days (range = 10 -54 days). However, this length of hospital stay is not directly related to the tracheostomy procedure since the period of cannulation was low. Rather, the mean length of hospital stays observed in this study is related to factors such as delays in surgery following admission (as a result of patient and theatre logistics factors), need to care for the postoperative surgical site, and preparations for the commencement of oncological care in malignant tumor cases. Previous studies documented a mean length of hospital stay ranging from 15.5 to 56 days [11, 14, 30].

An overall complication rate of 15.6% was recorded in this retrospective study and death was the main complication. Mortality was related to severe hypoxia following failed endotracheal intubation (can't intubate, can't ventilate situation) and premature decannulation. The

mortality rate recorded (8.9%) is higher than findings from other studies [13, 15]. However, higher mortality rates have also been reported [11,14]. Commonly reported complications directly related to tracheostomy include surgical emphysema, chest infection, stoma infection, and granulation tissue formation [10, 11, 14, 25].

CONCLUSION

In resource-limited environments, the maxillofacial surgical team is frequently given little facility to work with and often face challenging cases. Tracheostomy offers the surgeon an opportunity to improve the quality of life of these patients who otherwise cannot be safely anaesthetized due to limited facilities or skilled manpower. This procedure in maxillofacial surgical patients appears to be directly associated with minor complications and lower cannulation time. It should form part of the surgical armamentarium of all maxillofacial surgeons in this setting.

REFERENCES:

1. Apfelbaum JL, Hagberg CA, Caplan RA, Blitt CD, Connis, RT, Nickinovich DG, et al. Practice guidelines for management of the difficult airway: an updated report by the American Society of Anesthesiologists Task Force on Management of the Difficult Airway. *Anesthesiology.* 2013 Feb; 118(2):251-70. [PubMed] [CrossRef]

2. Kheterpal S, Healy D, Aziz MF, Shanks AM, Freundlich, RE, Linton F, et al. Incidence, predictors, and outcome of difficult mask ventilation combined with difficult laryngoscopy: a report from the multicenter perioperative outcomes group. *Anesthesiology*. 2013 Dec;119(6):1360-9. [PubMed] [CrossRef]

3. Adnet F, Borron SW, Racine SX, Clemessy JL, Fournier JL, Plaisance P, et al. The intubation difficulty scale (IDS): proposal and evaluation of a new score characterizing the complexity of endotracheal intubation. *Anesthesiology.* 1997 Dec;87(6):1290-7. [PubMed]

4. el-Ganzouri AR, McCarthy RJ, Tuman KJ, Tanck EN, Ivankovich AD. Preoperative airway assessment: predictive value of a multivariate risk index. *Anesth Analg.* 1996 Jun;82(6): 1197-204. [PubMed]

5. Collins SR. Direct and Indirect Laryngoscopy: Equipment and Techniques. *Respir Care.* 2014 Jun; 59(6): 850-64. [PubMed] [CrossRef]

6. Harun-or-Rashid Md, Taous A. Comparative study on complications of emergency and elective tracheostomy. *Bangladesh J Otorhinolaryngol.* 2015 Oct;21(2):69-75. [CrossRef]

7. Graham JS, Mulloy RH, Sutherland FR, Rose S. Percutaneous versus Open Tracheostomy: A Retrospective Cohort Outcome Study. *J Trauma.* 1996 Aug;41(2):245-50.

8. Engels PT, Bagshaw SM, NMeier M, Brindley PG. Tracheostomy: from insertion to decannulation. *Can J Surg*. 2009 Oct;52(5):427-33. [PubMed]

9. Akinmoladun V, Arotiba J, Onakoya P, Adeyemo A, Sotunmbi P. An Evaluation of Open Tracheostomy in Oral and Maxillofacial Surgery. *Niger J Surg Sci.* 2007; 17:96-100.

10. Salgarelli AC, Collini M, Bellini P, Cappare P. Tracheostomy in Maxillofacial Surgery: A Simple and Safe Technique for Residents in Training. *J Craniofac Surg*. 2011 Jan; 22(1):243-6. [PubMed] [CrossRef]

11. Gilyoma JM, Balumuka DD, Chalya PL. Ten-year experiences with Tracheostomy at a University teaching hospital in NorthwesternTanzania: A retrospective review of 214 cases. *World J Emerg Surg.* 2011 Nov; 6:38. [PubMed] [CrossRef]

12. Ali MA, Ibrahim IA. Five-Year Experience with Tracheostomy at ENT-Khartoum Teaching Hospital in Sudan. *Merit Res J Med Med Sci.* 2016 Feb; 4(2):92-7.

13. Kodiya AM, Afolabi AO, Grema US, Ajayi IO, Ngamdu YB, Labaran SA. Tracheostomy in Northern Nigeria - A Multicentre Review. *East Cent Afr J Surg.* 2013 Apr;18(1):65-70.

14. Amusa YB, Akinpelu VO, Fadiora SO, Agbakwuru EA. Tracheostomy in surgical practice: Experience in a Nigerian Tertiary Hospital. *West Afr J Med.* 2004 Jan-Mar;23(1):32-4. [PubMed]

15. Haspel AC, Coviello VF, Stevens M. Retrospective study of tracheostomy indications and perioperative complications on oral and maxillofacial surgery service. *J Oral Maxillofac Surg.* 2012 Apr;70(2):890-5. [PubMed] [CrossRef]

16. Henderson JJ, Popat MT, Latto IP, Pearce AC. Difficult Airway Society guidelines for management of the unanticipated difficult intubation. *Anaesthesia*. 2004 Jul;59(7):67-94. [PubMed] [CrossRef]

17. Hall CE, Shutt LE. Nasotracheal intubation for head and neck surgery. *Anaesthesia.* 2003 Mar;58(3): 249-56. [PubMed]

18. Zhang J, Lamb A, Hung O, Hung C, Hung D. Blind nasal intubation: teaching a dying art. *Can J Anaesth.* 2014 Nov;61(11):1055-6. [PubMed] [CrossRef]

19. Yoo H, Choi JM, Jo JY, Lee S, Jeong SM. Blind nasal intubation as an alternative to difficult intubation approaches. *J Dent Anesth Pain Med.* 2015 Sep;15(3):181-4. [PubMed] [CrossRef]

20. Batra YK, Mathew PJ. Airway Management with Endotracheal Intubation (Including Awake Intubation and Blind Intubation). *Indian J Anaesth.* 2005 Aug;49(4):263-8.

21. Chemsian RV, Bhananker S, Ramaiah R. Videolaryngoscopy. *Int J Crit Illn Inj Sci.* 2014 Jan-Mar; 4(1):35-41. [PubMed] [CrossRef]

22. Cheyne DR, Doyle P. Advances in laryngoscopy: rigid indirect laryngoscopy. *F1000 Med Rep*. 2010 Aug; 2: 61. [PubMed] [CrossRef]

23. Cole RR, Aguilar EA 3rd. Cricothyroidotomy vs tracheostomy: An Otolaryngologist perspective. *Laryngoscope.* 1988 Feb;98(2):131-5. [PubMed] [CrossRef]

24. Dillon JK, Christensen B, Fairbanks T, Jurkovich G, Moe KS. The emergent surgical airway: cricothyrotomy vs. tracheotomy. *Int J Oral Maxillofac Surg*. 2013 Feb; 42(2):204-8. [PubMed] [CrossRef]

25. 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 Jul;72(4):218-20. [PubMed]

26. Santus P, Gramegna A, Radovanovic D, Raccanelli R, Valenti V, Rabbiosi D, et al. A systematic review on tracheostomy decannulation: a proposal of a quantitative semiquantitative clinical score. *BMC Pulm Med*. 2014 Dec;14:201 [PubMed] [CrossRef]

27. Hammarfjord O, Chee N, Norton J, Stassen LF. Tracheostomies for oral and maxillofacial oncology operations: a retrospective study of 125 cases of early primary closure of the tracheostomy site. *Br J Oral Maxillofac Surg*. 2013 Sep;51(6):e79-e136.

28. Christopher K. Tracheostomy decannulation. *Respir Care*. 2005 Apr; 50(4):538-41. [PubMed]

29. Cetto R, Arora A, Hettige R, Nel M, Benjamin L, Gomez CM, et al. Improving tracheostomy care: a prospective study of the multi-disciplinary approach. *Clin Otolaryngol*. 2011 Oct;36(5):482-8. [PubMed] [CrossRef]

30. Coln CE, Purdue GF, Hunt JL. Tracheostomy in the young pediatric burn patient. *Arch Surg*. 1998 May; 133(5):537-9. [PubMed] [CrossRef]

Please cite this article as: Agbara R, Fomete B, Athanasius-Chukwudi O, Uchenna-Kevin O, Onyebuchi P, Idowu EA. Open tracheostomy in oral and maxillofacial surgery in a resource limited setting: the hope of whom little is given. *J of IMAB*. 2018 Jul-Sep;24(3):2142-2148. DOI: https://doi.org/10.5272/jimab.2018243.2142

Received: 15/02/2018; Published online: 03/09/2018

Address for correspondence:
Dr Rowland Agbara
Department of Dentistry, Faculty of Medical Sciences, University of Jos, Plateau state, Nigeria.
Phone: +2348034627811
E-mail: row_prof@yahoo.com