



## CASE REPORT



# CHALLENGES OF AIRWAY MANAGEMENT IN A PATIENT WITH MAXILLOFACIAL INJURY IN A RESOURCE POOR ENVIRONMENT

P.U. Onwuadika, A.I. Eshiet, I.U. Ilori, Q. Kalu, R.A. Beshel-Akpeke, A. Ebeiyamba, I.E. Ukpabio, F.B. Ugot, J.O. Enabulele

Department of Anaesthesiology, University of Calabar Teaching Hospital (UCTH), Calabar

### ABSTRACT

Maxillofacial injuries can be frightening. It often presents with disfiguring facial appearance. These injuries usually result from high velocity trauma. Advance Life Trauma Support (ALTS) recommends that, in management of patients with Life-threatening injuries, airway maintenance with cervical spine immobilization should be the first priority. Securing the airway in these patients is often difficult in spite of all modalities available, because these injuries are often complicated by injuries to various routes of intubation, associated C-spine injury, and high risk of regurgitation and aspiration. Difficult airway should always be anticipated and planned for. Good assessment of the injuries and careful formulation of airway management plan is very essential for better outcome.

### Method

We report a 55yr old man who presented in a peripheral Hospital with scary facial avulsion involving half of the face, with associated mandibular fractures, multiple scalp lacerations and open fracture of the tibia and fibula, secondary to Road Traffic Accident (RTA).

He was transferred to this facility after being rejected by other facilities within vicinity. He was one of the few survivor of a ghastly Vehicular motor accident. History could not be obtained, as the patient was still confused and there was no eye witness.

Examination revealed a confused patient, in painful distress, he is conscious with GCS of 13/15, with active bleeding from the facial injuries, scalp, and the mouth. The Right lower limb was splinted (had Fractured Tibia and Fibular). There was no CSF otorrhea nor rhinorrhea. BP ranged between 100/60 – 110/70. Pulse 110-126 bpm (after resuscitation), SPO2 96-

98% (room air) with respiratory rate of 20 breaths/min, no respiratory difficulty. Airway assessment revealed multiple abrasion around the neck, bleeding from the angle of the mouth, with exposed mobile, fractured, right mandible. Urgent blood grouping and cross-matching was the only investigation one could assess.

He was premedicated with intravenous Ranitidine and Metorclopramide.

Difficult airway was anticipated and planned for. Though there was no Fiberoptic laryngoscope, and other visual aids of securing the airway, and no ENT surgeon within the facility, however we had Resus I-gel LMA, Classic LMA, intubating bougie, and a 16G cannular with a connector, as back up.

The airway was successfully secured via nasotracheal intubation using the conventional Macintosh laryngoscope, after induction with Ketamine, with Cricoid pressure application and In-Line stabilization of the C-spine. Patient had a successful surgery. Extubation was done 4 days later and patient made a good recovery.

### Conclusion

Airway management in Maxillofacial injuries is challenging irrespective of the environment and equipment available. Clinical status and features of the trauma dictates the approach for securing the airway. Various steps of difficult airway management need to be planned before airway management is initiated. Familiarizing with the available airway devices is necessary for better outcome as seen in this management.

**Key words:** Challenges, Airway management, Maxillofacial Trauma, Resource poor environment

### INTRODUCTION

Management of any traumatized patient is based on the premise of ABC of resuscitation. Advance Life trauma support recommends that airway maintenance with cervical spine control should be prioritized in any traumatized patient,

because loss of airway kills faster than loss of ability to breath or circulation problems.<sup>1</sup> Thus, life-saving intervention should begin with airway management. Problems in airway management could lead to grave consequences in general surgical population.<sup>2,3</sup> Gruen et al reported 16% mortality

Corresponding Author: Dr Onwuadika Placid, U. Dept of Anaesthesia, University of Calabar Teaching Hospital Calabar.  
Email: placidonw@gmail.com Tel: 08038436037



attributed to airway management problems in in-patient surgical patients in 2594 population studied.<sup>4</sup>

Patients with maxillofacial injuries present unique airway management challenges irrespective of the environment, preoperatively, intraoperatively and post operatively. Often, there is little time available to decide the optimal method to secure the airway under a particular set of circumstances, because the patient's condition is unpredictable.

Securing the airway in these patients is often difficult in spite of all modalities available, because the injuries are often complicated by injuries to various routes of intubation, which is often associated with C-spine injury, and high risk of regurgitation and aspiration. Airway obstruction from hemorrhage, tissue prolapse, or edema may require emergent intervention for which multiple intubation techniques exist. Competing needs for both airway and surgical access create intraoperative conflicts during repair.

Difficult airway management should always be anticipated and planned for. Good assessment of the injuries and careful formulation of airway management plan and skill are essential for better outcome.

This case is presented to illustrate the use of conventional Macintosh laryngoscope in airway management of a patient with a disfiguring maxillofacial injury in a resource poor health facility.

### CASE REPORT

We report a 55yr old man who presented in a peripheral Hospital with scary facial avulsion involving half of the face, with associated mandibular fractures, multiple scalp lacerations and open fracture of the tibia and fibula, secondary to Road Traffic Accident (RTA).

He was transferred to this facility after he was rejected by other facilities within the locality. He was one of the few survivor of a ghastly Vehicular motor accident. History could not be obtained, as the patient was still confused and there was no eye witness too, thus, the rescue team that brought him left immediately after the transfer.

Preoperative general physical examination revealed a confuse patient, in painful distress, with scary, disfiguring, avulsed face extending from the right mandibular area to the frontal part, with exposed zygomatic bone & multiple fractured right(Rt) mandible, moderately pale, acynosed, moderately dehydrated.

*Vital signs*; BP 100/60—110/70mmHg, PR 110-126bpm, SPO<sub>2</sub> 96—98% (Room air), RR 20breaths/min. {post resuscitation}

*Airway assessment*: exposed fractured Rt mandible, thus exposing the oral cavity, multiple bleeding around the region. Avulsed zygomatic region and frontal region sparing the nasal cavity. There were multiple abrasions around the anterior neck region, no neck oedema, no neck tenderness.

*Systemic examination*. MSS- Moderately blood stained dressing (around the knee) over the splinted Rt lower limb (open Tibia/fibular fracture). Other systemic examinations--- no significant findings.



*Patient picture showing the avulsed face, pointer showing fractured mandible at presentation*

Urgent pcv, grouping and cross-matching were requested for. IV Metorclopramide 10mg, IV Ranitidine 50mg and IV paracetamol 900mg were administered.

Patient was transferred to OR to secure the airway and repair the avulsed face to control the bleeding.

In the OR, patient oxygen therapy was instituted via nasal prongs at 4L/min (the nasal cavity was spared). Additional IV access was secured with available 18G cannular (the IV line sited with 20G cannular was functional), connected to intravenous fluid (IVF) normal saline (N/S).

Pulse oximeter probe (from Lifebox) was attached and BP measurement was via the conventional manual Mercury Sphygmomanometer and stethoscope. These were the only monitoring device in the operating room.

Resuscitation drugs were drawn and kept. Macintosh laryngoscope with blade sizes 3&4, endotracheal(ET) tube tube size 7.5, 8.0, 8.5mm ID, Magill forceps, Classic LMA, Resus i-gel size 4, 14g cannula with size 2.5 ET-tube connector for attachment( for emergency cricothyroidotomy in case tracheal intubation and facemask ventilation fails).





Picture showing a 16G cannula + 2.5 ETT connector (for emergency cricothyroidotomy) & Resu I-gel LMA

Initially facemask placement was difficult because of air leakage around the avulsed area, however, we overcame this by packing the area with gauze, thus facemask placement was successful & preoxygenation was achieved. Cricoid pressure was applied before induction. (it was explained to the patient before he was taken to OR).

Induction of anaesthesia was achieved with Ketamine 75mg. After 60sec, well lubricated 8.0mm was gently passed via the left nostril, then laryngoscopy was done using size 4 blade, the view of Comack & Lahane grade 1, then with the aid of Magill forceps, the trachea was successfully intubated via the nasal route at first attempt. The cuff was inflated and ET intubation was confirmed by bilateral auscultation of the lung apices and axilla (there was no capnography), which was connected to Self-inflating resuscitation bag attached to oxygen cylinder, through which intermittent positive pressure ventilation was carried out (there was no functional anaesthetic machine in the OR).



Patient immediately after intubation before start of surgery

Hypnosis and analgesia were maintained with intermittent boluses of ketamine in 15mg aliquots every 15-20min, and ventilation was assisted intermittently via a self-inflating resuscitation bag. There was no muscle relaxant available within the facility. Analgesia was augmented with IV tramadol 100mg in 20mg aliquots. Fluid balance was maintained with N/S. Also he had 3units of fresh whole transfused intra-operatively because of severe anaemia from excessive haemorrhage.

At the end of surgery, the oropharynx was suctioned, and oropharyngeal airway was inserted. ET tube was left in situ (since it was nasotracheal), and patient was transferred to their recovery room, where he was monitored for 48hrs before he was transferred to the ward (because the facility does not have ICU). Post-operative pain was managed with IV tramadol 100mg 12hourly and IV pentazocine 30mg 6hourly.





Picture showing patient being ventilated with Ambu-bag during the surgery

He commenced enteral feeding via NG tube 2 days later and was extubated 4 days later without any problem, but continued with the NG feeding because of the mandibular fracture. He made good recovery.



Patient immediately after surgery before dressing



Patient 10days post-surgery& trauma

## DISCUSSION

Patients with maxillofacial injury presents serious challenges to the Anaesthetist, because airway management in these patients can be complicated by other associated injuries, as seen in our patient. The first challenge is to secure the airway for sufficient and effective breathing and ventilation. In securing their airway, the attending Anaesthetist has to consider the following; (a) the nature of trauma; (b) how it affects the airway, (c) potential difficulties in mask ventilation and endotracheal intubation, (d) possible C-spine trauma, (e) the risk of regurgitation and aspiration of gastric contents, (f) bleeding that may preclude view of airway anatomy and may cause circulatory deterioration. We considered all these factors during the management.

For safe and optimal management of patients with maxillofacial injury, appreciation of the nature of trauma is very important. Hutchison et al<sup>1</sup> described 6 specific situations associated with maxillofacial trauma which can adversely

affect the airway. 1 posterior displacement of a fractured maxilla parallel to the inclined plane of the base of the skull may block the nasopharyngeal airway. 2. A bilateral fracture of the anterior mandible may cause the fractured symphysis and the tongue to slide posteriorly and block the oropharynx in the supine patient. 3. Fractured or exfoliated teeth, bone fragments, vomitus, blood and secretions as well as foreign bodies such as dentures, debris, and shrapnel, may block the airway along the oropharynx and larynx. 4. Hemorrhage from distinct vessels in open wounds or several nasal bleeding from complex blood supply of the nose may contribute to airway obstruction. 5. Soft tissue swelling and edema which results from trauma of the head and neck may cause delayed airway compromise. 6. Trauma to the larynx and trachea may cause swelling and displacement of structures such as the epiglottis, arytenoid cartilages, and vocal cords, thereby increasing the risk of cervical airway obstruction. Our patient had 2 to 6 associated specific situation, though his mandibular fracture was unilateral.

Once the airway management has been completed, hemorrhage controlled, definitive management of soft tissue and bone injuries may be deferred until life / or organ threatening injuries are managed. In line with this guideline, we secured his airway first, before the surgical repair commenced. A high index of suspicion, meticulous examination and close monitoring of the patient may assist in early detection of such situations and thus facilitate proper and timely management to avoid further complications.

**Airway:** airway evaluation should be as thorough and quick as possible. However, defining the exact difficulty involved could direct the attending Physician to the best approach to managing that airway. Patients with maxillofacial trauma often present a problem of difficult mask ventilation and intubation, because the trauma disrupts the normal anatomy of the airway. This was typified in this patient. The mask cannot be properly close-fitted to the face, to enable effective mask ventilation. Thus several manoeuvre has to be carried out to achieve this. We achieved proper facemask placement by packing layers of gauze to cover the soft tissue defects around the patient's mouth.

The challenge in performing the intubation arises mainly from a difficulty in visualizing the cords with direct laryngoscopy, however, visualizing the vocal cord after laryngoscopy was not difficult in this patient. The patient had Grade 1 of Commack and Lahane grading system. The oral cavity, pharynx, larynx may be filled with blood, secretions, debris, soft tissue and bone fractures, all of which preclude good visualization of the cords. This was achieved by proper suctioning before we intubated the patient.

Apart from the problem of anticipated difficult airway, several other factors may worsen the scenario;

**C-spine injury.** These patients should be assumed to have

associated c-spine injury until proven otherwise, and should be managed as such. Complete c-spine clearance may take hours and sometimes days, and until then, the patient's neck should be supported by a neck collar and all neck movements should be avoided. Though, our patient has no neck collar applied (due to non-availability), but his neck movements were restricted. At intubation, an assistant performs "in-line stabilization" in order to support the head and neck in place and prevent neck flexion throughout the procedure.<sup>5</sup> Though recent data suggest that direct laryngoscopy and intubation are unlikely to cause clinically significant neck movements and, on the other hand, "in-line stabilization" may not always immobilize injured segments effectively. In addition, "in-line stabilization" degrades the laryngoscopic view which may in turn cause hypoxia and worsen the outcome.<sup>6,7</sup> Robitaille et al<sup>8</sup> suggested the use of the Glidescope Video laryngoscopy for intubation rather than Macintosh, because of minimal neck movement associated with its use. We performed Manual in-line stabilization during laryngoscopy and intubation, and no difficulties were encountered.

**Full stomach:** maxillofacial injured patients are considered to have 'full stomach', since there was no time for stomach emptying prior to intubation. Also these patients often bleed from the respiratory and GI tract, thus blood is swallowed and accumulates in the stomach, thereby further increasing the risk of regurgitation and aspiration. Suggestions on how to diminish this risk have been made; NG-tube suctioning before intubation and the use of Sellick's<sup>9</sup> manoeuvre during airway management. We passed NG-tube on our patient & suctioned the gastric contents before induction of anaesthesia. Thereafter, the tube was removed and re-passed after ET-intubation since nasal route for ET-intubation was considered.

Although cricoid pressure and rapid sequence induction are widely used, the effectiveness and safety of the technique have been questioned.<sup>10</sup> Several studies have shown that cricoid pressure may significantly worsen the laryngeal view, making endotracheal intubation more difficult.<sup>11-13</sup> however, Sellick's manoeuvre was also applied and we did not encounter any difficulty with laryngoscopy and intubation. Also, as part of the precautionary measure to prevent regurgitation and aspiration of gastric contents, he received 10mg of metoclopramide (as a prokinetic) minutes prior to induction of anaesthesia. He also received 50mg of ranitidine to inhibit further gastric acid secretion.

**Post-operative management.** Patients with difficult airway are also at high risk for complications in the post-operative period. After surgery, the mucous membrane and other soft tissues are edematous, narrowing the airway. Neck expandability becomes relatively low and even small haemorrhage around that region could result in airway compromise. Peterson et al<sup>14</sup> reported 12% and 5% ore we



complication rate at extubation and recovery respectively. In line with this, we left the ET-tube insitu till the 4<sup>th</sup> day before we considered extubation, which was done on that 4th day, as the oedema has regressed, since in intubated maxillofacial trauma patients, extubation is deferred until normal anatomy is restored or at least until the edema subsides. During extubation, the patient should be monitored closely and the care providers should be prepared for possibility of re-intubation. This was observed in the management of this patient. For tracheostomy tube, the patient should be awakened and allowed to breathe spontaneously through the tube for few days before extubation<sup>15</sup>. Our patient had no need for tracheostomy.

### CONCLUSION

Management of airway in patients with maxillofacial injury is complex. It requires sound judgement and good experience which can be gained in management of similar emergencies. It is multi-disciplinary (Anaesthesiologist, Maxillofacial surgeon, ENT, General Surgeon and other relevant specialties).

Timely, decisive and skillful management can make the difference between ability and disability, life and death. Limitation should not limit your ability.

**Consent.** We obtained a written consent from this patient for the publication of this case report.

**Conflict of interest:** None

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**Recommendation:** Government should increase funding of health care facilities, employ adequate staff and periodic training and re-training of the staff to manage emergency situations like this. Also, the staff should know how to use the available resources, because this can salvage situations in some cases as seen in this case report.

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