

Case Report: A “Cannot Intubate, Cannot Ventilate” Situation Rescue by eFONA in Critical Care Unit

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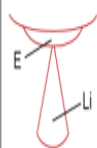



Abstract: 43-years-old male came to ER with recurrent history of squamous cell carcinoma of oral cavity, received two cycles of chemotherapy. Admitted in ward i/v/o cough, fever, mild breathlessness and drop in urine output. Initially taken on 6lpm o₂ by mask, vital trend: pulse-140/min, BP-130/80, spo₂~93%. On auscultation AEBE, mild crepts in left lower zone. Had desaturation on o₂ by mask, taken on NRBM-15lpm o₂. On NRBM-15lpm was maintaining saturation less than 80%. Shifted to ICU i/v/o desaturation and increasing respiratory distress and Hypotension, In ICU taken on high flow nasal oxygenation, with higher flow-60lpm, and fio₂-1.0. Vital trend: pulse-130/min, BP-100/60, saturation~87%. Underwent CT scan- suggestive of b/l consolidation. Required higher dose of norad infusion. In spite had severe hypotension and respiratory distress, taken on non-invasive ventilation and NORAD dosage was also increased. Patient went into Brady arrest, immediately CPR started as per ACLS protocol. Started with bag mask ventilation, but could not achieve ventilation, no chest rise could be seen. Patient desaturated up to 60%. Tracheal intubation attempted with video laryngoscope, the view was CL-grade-4 suggesting difficult airway. Laryngeal mask airway (LMA) was placed but ventilation was still not achieved. Cannot intubate, cannot ventilate and oxygenate (CICO) situation was declared. LMA was removed and Emergency front of neck access (eFONA) was performed, and ventilation was achieved. Patient had ROSC for next one hour, again underwent Brady arrest, could not revive after 45minutes of following ACLS protocol and declared dead.

Keywords: Difficult airway, eFONA, CICO

1.Introduction

The primary goal of airway management is the maintenance of alveolar oxygenation. Airway management using face mask ventilation, a supraglottic airway device (SAD), or tracheal intubation is a fundamental skill for all clinicians involved in airway management. Failure to achieve alveolar oxygenation using these methods may result in permanent harm and the risk of death⁽¹⁾. Tracheal intubation, most commonly performed using a direct laryngoscopy technique, is the gold standard in securing the airway and is considered mandatory in a variety of patient populations and operations⁽⁶⁾. The visibility of the glottis is often documented to describe intubating conditions. The Cormack–Lehane (CL) classification (Fig. 1) is a grading system commonly used to describe laryngeal view during direct laryngoscopy⁽⁷⁾.

The ‘can’t intubate, can’t oxygenate’ (CICO) situation occurs after attempts to manage the airway by a facemask, a supraglottic airway device, and a tracheal tube have failed. During CICO situation, profound hypoxia will result in cardiac arrest and death unless oxygenation can be rapidly restored. In the ICU, cardiac arrest and death secondary to hypoxia from failed oxygenation during airway management typically occurs within 45-60 min of the first airway intervention⁽³⁾.

| Original Cormack and Lehane system | I | II | III | IV | |
|------------------------------------|--|---|---|---|--|
| | Full view of the glottis | Partial view of the glottis or arytenoids | Only epiglottis visible | Neither glottis nor epiglottis visible | |
| View at laryngoscopy |  |  |  |  | |
| Modified system | I As for original Cormack and Lehane above | Ila Partial view of the glottis | Ilb Arytenoids or posterior part of the vocal cords only just visible | III As for original Cormack and Lehane above | IV As for original Cormack and Lehane above |

Source: Longnecker DE, Brown DL, Newman WF, Zapol WH: Anesthesiology, 2nd Edition: www.accessanesthesiology.com
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Figure 1⁽⁸⁾

2.Case Study

43 -year-old male came to ER with recurrent history squamous cell carcinoma of oral cavity. Received two cycles of chemotherapy (paclitaxel and cisplatin). Now came with chief complaints of fever, breathlessness, three episodes of loose motions, and drop in urine output. No complaints of nausea, vomiting and abdominal pain. On examination in ER was conscious, oriented. Vitals noted:HR-130/min, BP-100/90mmhg, saturation on room air was around 85% taken on 6lpm o₂ by mask, chest-mild b/lcrepts on auscultation, ABG-no metabolic acidosis, CXR-b/l haziness. Shifted to ward. On day 1 admitted to ward with 6lpm o₂ was maintaining sats~97%, HR~120/min, BP-100/65mmhg, continues to have breathlessness and productive cough and fever, started on antibiotics after lab investigations and other medications as per prescribed by the physician.

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On day 2 of admission patient had desaturation, sats~85%, hence o₂ was increased to 10lpm. Now HR~140/min, BP-130/80mmhg, spo₂~93%, on auscultation -AEBE, crepts in left lower zone. At 12pm had respiratory distress and desaturation, RR~30-35 and spo₂~78%, taken on NRBM-15lpm o₂. On NRBM-15lpm-spo₂ was still around 75-78%. Patient also had hypotension-BP~100/60mmhg started with fluid resuscitation. Immediately shifted to ICU. In ICU, taken on high flow nasal cannula oxygenation. Settings with high fio₂-100%, flow-60lpm, vital trend was spo₂-87%, HR~130/min, RR~25, bp~100/60. Started on NORAD infusion for hypotension. ABG-s/o HAGMA, increased lactates, and hypoxia-p/f ratio<100.

At 3pm, was vitally stable, underwent CT scan-suggestive of consolidation in right upper and b/l lower lobes, mostly suspected bacterial etiology. Sputum culture was sent.

At around 10pm had severe hypotension, bp~100/50, NORAD dose was increased, simultaneously had desaturation and respiratory distress, sats~70%, RR~50 on HFNO. Taken on non-invasive ventilation(NIV) with 100% fio₂. At 10:30pm had brady arrest, immediately CPR started as per ACLS protocol. Preoxygenation started with bag mask ventilation, no chest rise could be seen. Immediately tracheal intubation was attempted with video laryngoscopy, the view was CL-grade-4, suggestive of difficult airway. Laryngeal mask airway (LMA) was placed but still could not achieve ventilation. "Cannot intubate, cannot ventilate" situation was declared. Patient desaturated up to 60%, now LMA was removed, and emergency front of neck(eFONA)access was performed. The Scalpel cricothyroidotomy was performed by taking an incision at cricothyroid membrane, a bougie was inserted through the incision and then 6mmID endotracheal cuffed tube was guided through the bougie. As the tube was inserted immediately started with AMBU, now a definite chest rise could be seen and on auscultation breath sounds could be heard. The confirmation of correct placement of the tube was done by using capnography. Now after almost 45minutes of CPR patient achieved ROSC at 12am.

Post ROSC: vital trend: HR-110/min, BP-100/60mmhg, sats~90%, etco₂~16. Connected to ventilator on volume control mode, ABG- s/o respiratory acidosis. At 1am after one hour of ROSC, again had an episode of brady arrest. CPR started as per ACLS protocol, and continued for next 45minutes. However, patient could not revive despite of all resuscitative measures; declare dead at 2:30am.

3. Discussion

The Cormac and Lehane classification (Fig-1) is the standard for assessment of glottis view for prediction of difficult airways. Difficult intubation has been classified into four grades, according to the view obtainable at laryngoscopy⁽¹⁰⁾. More often grade 3 and grade 4 views are suggestive of difficult airways. The clinician could therefore visualise the grade and can immediately take next steps for securing the airway. A difficult airway includes the clinical situation in which anticipated or unanticipated

difficulty or failure is experienced by the physician trained in anesthesia care, including but not limited to one or more of the following: facemask ventilation, laryngoscopy, ventilation using supraglottic airways, tracheal intubation, extubation, or invasive airways⁽⁹⁾.

The 2015 Difficult airway society (DAS) guidelines for management of unanticipated difficult intubation in adults includes four plans, in which plan D suggest that in "cannot intubate and cannot oxygenate or ventilate" situation, the clinician should perform eFONA⁽¹⁾. As per the guidelines maximum of 3+1 attempts with direct or video laryngoscopy is recommended in the management of unanticipated difficult airways in adults.

There are three principle techniques for accessing the airway in an emergency CICO scenario: a) Scalpel cricothyroidotomy, b) Cannula cricothyroidotomy, c) Surgical tracheostomy⁽¹⁾. eFONA is the final, time-critical step in the management of a CICO situation (i.e. 'Plan D' in the DAS Difficult intubation guidelines). The clinician's reluctance to perform eFONA has been shown to be a major contributor to the morbidity and mortality in CICO situations⁽⁴⁾.

The procedure involves securing the airways via the anterior neck to facilitate oxygenation and ventilation within a short duration of time. Scalpel cricothyroidotomy, using a 'scalpel-bougie-tube' technique is recommended by the DAS guidelines as the first line technique for eFONA^(3,5).

It is the most reliable method in securing the airways in shorter duration of time. Insertion of the cuffed tracheal tube provides the ability to ventilate. This tube can protect airway aspiration. The confirmation of correct placement of the tube can be done by using capnography. The surgically inevitable airway achieving alveolar oxygenation in some circumstances using standard airway and intubating techniques will appear to have a very high likelihood of failure from the onset and therefore deemed too high risk. These can include patients with upper airway obstruction from advanced head and neck tumours, traumatic injuries to the face and neck, and severe airway oedema secondary to burn injuries, or infection. Alternative techniques such as awake fiberoptic intubation may not be feasible in such cases. Airway management may therefore necessitate a cricothyroidotomy or tracheostomy under local anaesthetic as the primary procedure to secure the airway⁽²⁾. In addition to scalpel cricothyroidotomy performing a prophylactic cannula cricothyroidotomy is recommended in the patients with higher risk of a CICO situation, this facilitates rapid conversion to eFONA⁽¹⁾.

Certain complications for eFONA in some studies includes device misplacement leading to failure to ventilate, bleeding, may cause damage to laryngotracheal structures, particularly to the posterior wall of trachea. The complication with the procedures also includes the high risk of pneumothorax, pneumomediastinum and subcutaneous emphysema⁽¹⁾. Apart from this for the creation of emergency surgical airway, the emergency

cricothyroidotomy is the final step in CICO conditions. Thus efont is the life saving procedure in difficult airway management during cardiac arrest or any other unanticipated airway in any departments apart from intensive care unit.

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