

# Prolonged Upper Airway Obstruction In An Eclamptic Patient - Challenges Of Management.

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## Abstract

A 32-year old pregnant woman, Gravida 2, para <sup>1+0</sup> was rushed into the Emergency Ward of our hospital in an unconscious state having complained of severe headache a few hours before admission. She was a known hypertensive being managed on alpha methyldopa and nifedipine.

Physical examination revealed an unconscious woman, with mild pitting pedal oedema. Her respiratory rate was 36 cycles per minute, BP was 150/100 mm Hg. Abdominal examination revealed a term fundal height and foetal heart rate of 160 bpm. Urinalysis showed a proteinuria of 2+ on dipstick. A diagnosis of antepartum eclampsia superimposed on chronic hypertension was made. After initial resuscitation, she had emergency Caesarean section under general anaesthesia, the larynx admitting a small-sized endotracheal tube (6.0mm ID). Oedema of the larynx was noted at intubation. Post-extubation, she had severe upper airway obstruction necessitating immediate re-intubation and she was admitted into the Intensive Care Unit (ICU).

Gross enlargement of the tongue was noticed on the first postoperative day, which persisted for five weeks, but with gradual reduction in size. Attempts at extubation on the first, fourth and thirteenth postoperative days (P.O.D.) in the ICU resulted in upper airway obstruction and the endotracheal tube was left in-situ till the 20<sup>th</sup> postoperative day. She was also noticed to have a right-sided hemiplegia and a left facial nerve palsy secondary to a left hemispherical cerebrovascular accident.

This case is presented to highlight the challenges of prolonged upper airway management due to massive tongue enlargement complicating eclampsia.

**Key words:** eclampsia, upper airway obstruction, prolonged endotracheal intubation.

## Introduction

One of the major responsibilities of the anaesthetist in the management of patients is to ensure that the airway is constantly patent for adequate ventilation. These patients range from those who have surgical procedures under anaesthesia to those who have compromised airway from any cause. The pre-eclamptic/eclamptic patient may present with compromised airway oedema, including oedema of the larynx <sup>1,2</sup>.

Prediction of airway oedema in the pre-eclamptic/eclamptic patient is not always possible but the presence of stridor and/or facial oedema may be a clue. Laryngeal oedema may become obvious only at laryngoscopy. Laryngeal oedema may worsen during the intraoperative period and airway embarrassment, sufficiently severe to require re-intubation, may follow <sup>1,3</sup>. The tongue may be swollen either as part of the airway oedema or following its laceration during fits causing respiratory embarrassment in the postoperative period.

Tracheal intubation may be indicated for the management of postoperative upper airway obstruction resulting from airway oedema in the pre-eclamptic/eclamptic patient. Tracheal intubation has supplanted tracheostomy as the method of choice for short-term management of the airway. However, in cases where the need for airway support is expected to surpass two to three weeks, tracheostomy may be considered early. Disadvantages of tracheal intubation for prolonged airway management are the need for intensive nursing care, difficulty in clearing copious secretions, frequent tube blockage with sometimes fatal consequences and frequent need for re-intubation when the tube is blocked.

Advantages of tracheostomy over tracheal intubation include easier nursing management, improved patient comfort, ability for oral nutrition and speech, and possible assistance of weaning by a 30-50% reduction in dead space. However, the benefits of tracheostomy over prolonged conventional intubation are controversial, in view of its complications. Certainly, tracheostomy should be considered when there are copious secretions in the airway requiring frequent suctioning and frequent tube blockage, also requiring multiple re-intubations. However, the

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method chosen for relief of prolonged upper airway obstruction ultimately depends on carefully weighing the benefits of one method over its disadvantages in the individual patient.

### Case report

A 32-year old pregnant woman, Gravida 2, para<sup>1+0</sup> was rushed into the Emergency Ward of our hospital in an unconscious state having complained of severe headache in the preceding hours. There was no history of fits given by her relatives who brought her unconscious and neither was there any history of instrumentation to the mouth before admission. She was a known hypertensive and had regular antenatal visits. Her booking blood pressure (BP) was 190/110 mm Hg and it ranged between 130/90–190/110 mm Hg during subsequent clinic visits. She was placed on alpha methyl dopa 500 mg b.i.d. and nifedipine 20 mg o.d.

Physical examination on admission revealed an unconscious woman, who was foaming in the mouth, with a mild pitting pedal oedema. Her pulse rate was 88 bpm, BP 150/100 mm Hg. Respiratory rate was 36 cycles/min and auscultation of the chest revealed bilateral transmitted sounds. The foetal heart rate was 160 bpm. She was admitted as a case of antepartum eclampsia superimposed on chronic hypertension. She was placed on oxygen therapy via a nasal catheter, intravenous diazepam 10 mg bolus dose and continuous infusion of 0.1 mg/min (6 mg/hr). Intravenous hydralazine 10 mg was administered when the diastolic BP exceeded 110 mm Hg. Investigation results were as follows: packed cell volume 34%, white cell count  $10.6 \times 10^9/L$  (neutrophils 59%, lymphocytes 31%, eosinophils 10%), platelet count  $187 \times 10^9/L$ ,  $Na^+$  140 mmol/L,  $K^+$  4.1 mmol/L,  $HCO_3^-$  25 mmol/L, urea 33 mmol/L and random blood sugar 4.7 mmol/L. Urinalysis showed a proteinuria of 2+ on dipstick.

After initial resuscitation, she had emergency caesarean section under general anaesthesia, endotracheal technique with muscle relaxation and controlled ventilation. The intraoperative course was uneventful. However, she developed severe respiratory distress post-tracheal extubation on account of suspected laryngeal oedema. She was immediately re-intubated and admitted into the Intensive Care Unit (ICU).

In the ICU, the endotracheal tube (ETT) was left in-situ while oxygen was administered via a catheter placed in the ETT. Diazepam infusion was continued while BP, arterial oxygen saturation ( $SpO_2$ ), urine output, temperature, electrocardiogram (ECG) and pulse rate were

monitored.

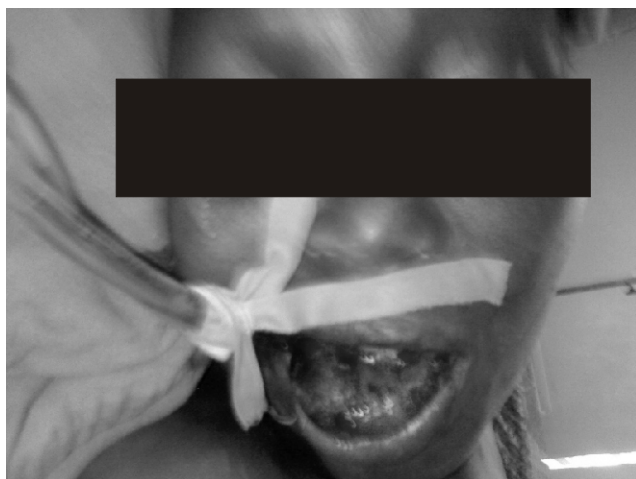
She was unconscious on the first postoperative day (POD) and her Glasgow Coma Score (GCS) was 9/15 with ETT. Gross enlargement of the tongue preventing closure of the mouth was noticed on the first POD (Figure 1). Her BP ranged between 151/90–199/133 mm Hg. She had a neurological deficit of right hemiplegia with left hemiparesis. A diagnosis of cerebrovascular stroke secondary to intrapartum eclampsia and hypertension was made. She was commenced on intravenous hydrocortisone 100mg 6hourly for 72hours for the management of airway oedema. She also had mannitol (20%) infusion, 250ml 8 hourly for 72hours. Intravenous hydralazine 5–10mg was administered as required. A trial extubation on the 1<sup>st</sup> POD resulted in severe respiratory distress and she was re-intubated.

On the 4<sup>th</sup> POD, the ETT became blocked necessitating extubation while she was closely observed for her ability to maintain her airway. However, she developed respiratory distress almost immediately and her trachea was intubated via the nasal route.

Her level of consciousness deteriorated from the 6<sup>th</sup> to 12<sup>th</sup> POD, with GCS score ranging between 6–9/15 for which the ETT was left in-situ. The BP during this period ranged between 150/100–190/120 mm Hg. She was commenced on amlodipine 10mg daily via a nasogastric tube through which she was also fed enterally with fortified pap formulated by the hospital nutritionist. A clinical suspicion of sepsis was made in view of her altered sensorium. After obtaining relevant samples for sepsis workup, she was commenced on intravenous (i.v.) ciprofloxacin 200mg 8hourly, i.v. ceftriazone 500mg 12hourly and intramuscular gentamycin 80mg 8 hourly.

The patient regained consciousness by the 13<sup>th</sup> POD with GCS of 12/15 with ETT. The ETT became blocked on the same day for which she was extubated. She had another episode of severe respiratory distress and was promptly re-intubated. She also had copious secretions in the airway requiring frequent ETT suctioning. A request for tracheostomy on the 14<sup>th</sup> POD on account of prolonged intubation, copious airway secretions and repeated blocked tube was not acceptable to the otolaryngology unit because of increased morbidity associated with the procedure. The patient was placed on i.v. glycopyrrolate 0.2mg as required for its antisialagogue effect.

The blood pressure gradually decreased from 12<sup>th</sup> POD (140/100 mm Hg) till discharge (125/60 mm Hg) from the ICU. She remained conscious, still with an enlarged tongue and a trial extubation on



the 25<sup>th</sup> POD was well tolerated. She had a husky voice for 72 hours post extubation. An oropharyngeal airway was inserted midway into the oral cavity to keep the mouth open because of the swollen tongue. The tongue gradually reduced in size and the airway was removed on the 34<sup>th</sup> POD.

She improved steadily with regular physiotherapy and was discharged to the neurological ward on the 36<sup>th</sup> POD. Apart from a husky voice lasting about 3 days post-extubation, there were no other immediate complications. She was finally discharged home on the 60<sup>th</sup> POD and followed up in the clinic.

## Discussion

Pre-eclampsia is the development of hypertension with proteinuria, oedema or both induced by pregnancy after the 20<sup>th</sup> week of gestation although it can occur earlier in the presence of trophoblastic disease. Oedema is manifested as the collection of fluid in the non-dependent portions of the body.

Upper airway and laryngeal oedema occur as part of the respiratory changes in pre-eclampsia. Laryngeal oedema was noted during tracheal intubation of this patient which necessitated the use of a small-sized endotracheal tube (6.0mm ID). Laryngeal oedema may not become apparent until laryngoscopy<sup>4</sup>.

Laryngeal oedema results in distortion of glottic architecture which may make intubation and airway management difficult<sup>5</sup>. In view of unpredictable airway oedema in pre-eclampsia or trauma to the tongue in eclampsia, anaesthetists should always have available a long stylet, a range of laryngoscope blades, a gum elastic bougie and a variety of tracheal tubes for difficult airway management<sup>6</sup>.

Awake fiberoptic intubation may sometimes be indicated<sup>2</sup>. Although difficult airway management

was anticipated in this patient, tracheal intubation was successful at the first attempt using small-sized ETT (6.0mm ID).

The immediate post-extubation upper airway obstruction in this patient was thought to be due to worsened laryngeal oedema. Laryngeal oedema is a rare but potentially serious complication of pre-eclampsia. It often occurs as part of the general oedema and facial swelling but occasionally it occurs with few warning signs. Repeat intubations should be avoided in these cases as they may worsen oedema<sup>1</sup>. As laryngeal oedema may also develop during the intraoperative period<sup>3</sup>, anaesthetists need to take care when extubating the trachea of these patients. Before extubation, the cuff should be deflated and the degree of airway oedema is assessed by occluding the tracheal lumen and allowing the patient to breathe around the tube as suggested by Potgieter and Hammond<sup>7</sup>. Although this cuff test was not done before the patient was extubated, plans for immediate re-intubation were put in place because of the laryngeal oedema that was noted at initial intubation.

Subsequent upper airway obstruction in this patient which required prolonged tracheal intubation was probably due to massive enlargement of the tongue. This massive enlargement could have resulted from laceration of the tongue during fits. No relatives witnessed any fits as she was found unconscious having complained of severe headache earlier. However, laceration of the tongue or bleeding into the airway to suggest injury was not evident at intubation. Laceration of the tongue leading to its swelling could also have resulted from multiple attempts at intubation but this was achieved at the first attempt in this patient. Another likely cause of the massive tongue enlargement was the generalized airway oedema complicating eclampsia. The prolonged postoperative upper airway obstruction in this patient presented very challenging airway management dilemma. Gross enlargement of the tongue resulting from snake envenomation and causing upper airway obstruction requiring tracheostomy has been reported in this environment<sup>8</sup>.

Prolonged tracheal intubation has supplanted tracheostomy as the method of choice for short-term management of the airway. However, in cases where the need for airway support is expected to surpass two or three weeks, tracheostomy should be considered early. Prolonged tracheal intubation was not anticipated in this patient but when it became obvious that the

patient could not be extubated on the 14<sup>th</sup> day and she had copious airway secretions which were difficult to aspirate, a suggestion for tracheostomy was made. It has been reported that prolonged tracheal intubation may result in laryngeal injury and changes such as laryngeal mucosal oedema, ulceration, granulation tissue formation, chronic laryngeal scarring and stenosis<sup>9</sup>. Red rubber tracheal tubes have largely been replaced by sterile disposable polyvinyl chloride (PVC) tubes since the former deteriorate on repeated use and are more irritant to the respiratory mucosa. The PVC tubes soften as they warm within the trachea and have high volume but low pressure cuffs and are therefore less likely to cause laryngeal injury. The PVC tube was used for this patient. This improvement in technique now permits intubation for periods more than the recommended two to three weeks and tracheostomy only becomes a necessity wherever prolonged tracheal intubation poses a threat to laryngeal injury<sup>10</sup>. Considered advantages of tracheostomy in prolonged airway management include a reduction in dead space and ease at removal of bronchial secretions and it is easier to manage than tracheal intubation. Tracheostomy

Also precludes the need to frequently change blocked tracheal tubes which is a more tasking procedure than cleaning a blocked inner tracheostomy tube.

However, that increased morbidity and length of time before extubation is possible with the tracheostomy are its major disadvantages<sup>11</sup>. Amusa et al<sup>11</sup> reported a 25% mortality associated with open surgical tracheostomy which was high compared to a mortality rate of 0.4% reported for percutaneous dilatational tracheostomy. However, they also attribute the high mortality rate to the primary disease for which tracheostomy was indicated. It would therefore appear that when there are no serious indications for tracheostomy in prolonged airway management, tracheal intubation may be a better alternative. This patient's airway was maintained with a tracheal tube for 25 days despite recurrent episodes of blocked tube necessitating repeated intubation while tracheostomy with its attendant complications was avoided.

## Conclusion.

The severely preeclamptic or eclamptic patient with airway oedema may present to the anaesthetist as a difficult airway preoperatively or as a compromised airway in the postoperative period. This patient presented with enlarged tongue

complicating eclampsia and resulting in prolonged compromised upper airway and challenges of prolonged airway management.

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