Anticipated Difficult Airway: A Nightmare when Resources are Limited

***Etta O, Eyo C, Udeme N**

ABSTRACT

Inability to manage a difficult airway is the cause of thirty to forty percent of all anaesthesia related deaths. A 31year old man scheduled for a debulking cheiloplasty following a vascular malformation involving the lower lip, tongue and facial skin. Examination showed a grossly enlarged lower lip and tongue. The primary anaesthetic concerns were anticipated difficult mask ventilation from poorly fitted face mask and surgical site bleeding. Therefore, our plan was to do a 'test laryngoscopy' under general anaesthesia with spontaneous breathing, and if intubation was deemed easy then proceed with nasotracheal intubation. Conversely, if intubation was deemed difficult, we planned to allow the patient to recover. The patient was pre-oxygenated with the available poorly fitted size 5 face mask. Anaesthesia was induced with Atropine 0.6mg, sodium thiopentone 350mg and halothane at 1-2 volume percent. The patient was mask ventilated with difficulty by two operators. A 'test laryngoscopy' was performed which showed Cormack-Lehane laryngoscopy grade 2. The laryngoscope was withdrawn, spontaneous ventilation with 100% oxygen continued, suxamethonium 100mg was given and laryngoscopy repeated after fasciculation which revealed grade 1 view with external laryngeal manipulation. A nasotracheal intubation with size 7 mm endotracheal tube was achieved and anaesthesia maintained with halothane, pancuronium and fentanyl till the end of surgery, and reversed with atropine/neostigmine combination. The patient was subsequently extubated and transferred to the ward. In difficult airway situations, where resources are inadequate, some unconventional strategies may be adopted provided the patient's safety is not compromised.

Keywords: Anticipated difficult airway, resource poor setting

INTRODUCTION

Inability to manage a difficult airway is the cause of thirty to forty percent of all anaesthesia related deaths.[1] A difficult airway is defined as the clinical situation in which a conventionally trained anesthesiologist experiences difficulty with facemask ventilation of the upper airway, difficulty with tracheal intubation or both.[2]

A difficult airway may be anticipated in the presence of some tell-tale pathologic and anatomic features in the head and neck regions as well as the use of some predictive tests.[3] When a difficult airway is anticipated, it allows for adequate preparation in terms of personnel and equipment to minimize serious airway related morbidity.[4]

Fortunately, recent advances in technology have led to the introduction of video laryngoscopes, and fibreoptic bronchoscopes, widely regarded as the gold-standard in airway management.[5] However, these equipment are in short supply in most developing countries, thus forcing anaesthesia providers to adopt some apparently risky, unconventional methods in difficult airway situations, especially during emergencies.[6,7] Here we report the successful management of an anticipated difficult airway in a resource-poor centre and discuss difficult mask ventilation.

Department of Anaesthesia, University of Uyo Teaching Hospital, Uyo, Akwa Ibom State.

*Corresponding author: otuetta@yahoo.com

CASE PRESENTATION

A 31yr old man was scheduled for a debulking cheiloplasty following a vascular malformation involving the lower lip, tongue and facial skin. There was no associated cough, difficulty in breathing, snoring or any other sleep disturbances.

Examination showed a young man with a grossly enlarged lower lip, which was relatively hyperemic, soft and slightly compressible, not tender and had no differential warmth (see Figure 1). The mouth opening was adequate, but the tongue was asymmetrically enlarged, the left half much larger than the right. The Modified Mallampati Test score was class II, and the vital signs were as follows: Pulse rate-78/minute, Blood pressure -100/70mmHg, Respiratory rate -20/minute and Temperature-36.8°C. His packed cell volume was 40%; the Urinalysis, Electrolytes, Urea and Creatinine values were within normal limits.

The primary anaesthetic concerns were anticipated difficult mask ventilation and surgical site bleeding. In the absence of advanced airway adjuncts such as video laryngoscope and fibreoptic bronchoscope in our centre, our plan was to do a 'test laryngoscopy' under general anaesthesia with spontaneous breathing, and if intubation was deemed easy (Cormack-Lehane laryngoscopy grade I or II) then proceed with nasotracheal intubation. If laryngoscopy was deemed difficult we planned to allow the patient to recover spontaneously, in which case the surgery would not proceed.

Figure 1

The patient was received in the theatre, and a multiparameter monitor attached. The baseline vital signs were as follows: Pulse rate-80/minute, blood pressure-136/74mmHg, and oxygen saturation-100%. An intravenous access was achieved on the left hand and 1L of 0.9% saline was set up to run slowly.

The patient was preoxygeneted with 100% oxygen using the available poorly fitted size 5 facemask. After giving 0.6mg of atropine, anaesthesia was induced with 350mg of thiopentone sodium followed by halothane at 1-2 volume percent. Under deep anaesthesia, the patient was mask ventilated by two operators, one holding the mask with both hands, while the other ventilated with the reservoir bag. Though the mask ventilation was difficult due to significant gas leak and high airway pressure, the SpO_2 was maintained at 100%. A 'test laryngoscopy' was performed with a size 4 blade which showed Cormack-Lehane laryngoscopy grade 2 with external laryngeal manipulation. At this point the laryngoscope was withdrawn and an oropharyngeal airway inserted and spontaneous ventilation continued with 100% oxygen. Suxamethronium 100mg was immediately given, and after fasciculation laryngoscopy was repeated which revealed grade 1 view with external laryngeal manipulation. A nasotracheal intubation was successfully performed at a single attempt with size 7mm endotracheal tube. Anaesthesia was maintained with halothane at 0.8-1.5%, midazolam 3mg, fentanyl 100mg, and pancuronium 6mg.

A first stage debulking cheiloplasty was performed. The estimated blood loss was 700mls, and a total of 3500mls of normal saline was infused. The patient remained hemodynamically stable throughout the procedure which lasted 2 hours and 40 minutes. The vital signs throughout the procedure were averagely as follows: Pulse rate-84/minute, Blood pressure-125/84mmHg, SpO_2-100%.

Postoperatively, muscle relaxant was reversed with atropine/neostigmine combination and the patient was transferred to the recovery room where he was extubated fully awake and stable, and subsequently transferred to the surgical ward 45 minutes later.

DISCUSSION

Mask ventilation is the most basic, and arguably most important skill in airway management.[4] The American Society of Anesthesiologists (ASA) defined Difficult Mask Ventilation (DMV) as a clinical situation in which it is not possible for the anesthesiologist to provide adequate facemask ventilation due to inadequate mask seal, excessive gas leak, or excessive resistance to the ingress or egress of gas.[3] Other authors have added more criteria to this definition including the inability to maintain oxygen saturation above 92%, using the oxygen flush more than twice, requiring two operators or a change of operator.[8,9] Our patient qualified for difficult mask ventilation on account of the inadequate mask seal, excessive gas leak, resistance to the ingress of gas and the use of two operators.

In the general adult population, the incidence of difficult mask ventilation is 5%.[8] Several predictive factors have been proposed. An early study highlighted five independent factors, - Obese, Bearded, Elderly (>55yrs), Snorer, and Edentulus (OBESE).[8] Further study on difficult mask ventilation has added modified Mallampati class 3 or 4, limited jaw profusion, and the male sex.[10] In our patient, the lower lip mass which distorted the face hence causing an inadequate mask seal, and the macroglossia were the primary predictors of difficult mask ventilation. Previous studies had reported several factors causing difficult mask ventilation including cervical teratoma, facial injuries and Parry-Romberg Syndrome causing facial deformity.[5,11,12]

The practice guidelines for management of the difficult airway recommends that at least one portable storage unit that contains specialized equipment for difficult airway management should be readily available.[2] These equipment include: rigid laryngoscope blades of alternate design and size from those routinely used(rigid fibreoptic laryngoscope, video laryngoscope), tracheal tubes of assorted sizes, tracheal tube guides (semirigid stylets, ventilating tube-changer, light wands), supraglottic airway (LMA or intubating LMA of assorted sizes for non invasive airway ventilation/intubation), and equipment suitable for emergency invasive airway.[2]

Awake fibreoptic intubation is considered the gold standard in difficult airway management. However, if difficult mask ventilation is encountered after induction of general anaesthesia, supraglotic airway (SGA) devices such as LMA are advocated to facilitate ventilation. If SGA fails and intubation is unsuccessful an emergency invasive airway access is advised.[2]

Previous studies have documented the successful use of fibreoptic bronchoscopes to achieve intubation when there is a difficult mask ventilation.[13,14] Recently, Jayaram and colleagues reported the use of gauze sponges applied over the maxilla and buccinators to achieve adequate seal in two patients with facial deformity following Parry-Romberg Syndrome.[12] Furthermore, Jayaram reported on the experience of gauze sponges being inadequate to prevent gas leak during mask ventilation of a patient, thus, a mold prepared using play dough placed over the facial defect and a face mask applied over the mold facilitated mask ventilation.[12] Other researchers in resource constrained centres have previously reported the use of other unconventional strategies in difficult airway situations.[5,6,7]

In our study, the key to successful difficult airway management was the use of two operators during mask ventilation which ensured 100% oxygen saturation inspite of the difficulty, and the 'test laryngoscopy' which was performed to assess the larngoscopy grading before the administration of muscle relaxant and subsequent intubation. Our alternative was to wake up the patient if the 'test laryngoscopy' had suggested difficult intubation or use an LMA to ventilate the patient if intubation proved difficult after the administration of a muscle relaxant.

CONCLUSION

In difficult airway situations, where resources are inadequate, some unconventional strategies may be adopted provided the patient's safety is not compromised.

REFERENCES

1. Heater CE, Dietrich SA, White SW, Secrest JA, Lindgren KR, Smith T. A comparison of preoperative airway assessment techniques: The Modified Mallampati and the upper lip bite test. *AANAJ* 2007;75:177-82.
2. 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* 2003;98:1269-77.
3. EttaOE, Edentekhe TA, Akpan SG. Prediction of difficult laryngoscopy in a homogenous population: the role of height. *African Journal of Anaesthesia and intensive care* 2015;15:1-5.
4. Crawley SM, Dalton AJ. Predicting the difficult airway. *Continuing Education in Anaesthesia critical Care & Pain* 2015;15:253-7.
5. Kwari YD, Sani A, Balami AP. Management of Difficult Airways due to cervical teratoma presenting with Respiratory Distress at Birth: Report of two cases. *J Anesthe Clinic Res* 2012;3:191.

6. Rabiu TB, Fadare AE. A new low-cost method for difficult airway management in non-missilepenetrating cervical Spine injury. *Indian J Anaesth* 2012;56:162-4.
7. Edem BE, Adekwu A, Efu ME. Kuni J, Onuchukwu G, Ugwuadu J. Anaesthetic and surgical management of airway penetrating injuries in children in resource-poor setting: case reports. *Int J Surg case Rep* 2017;39:119-22.
8. Langeron O, Masso E, Huraux C, Guggiari M, Bianchi A, Coriat P *et al.* Prediction of difficult Mask Ventilation. *Anesthesiology* 2000;92:1229-36.
9. Yildiz TS, Solak M, Toker K. The incidence and risk factors of difficult mask ventilation. *J Anaesth* 2005;19:7-11.
10. Kheterpal S, Martins L, Shanks AM, Tremper KK. Prediction and outcome of impossible mask ventilation: a review of 50,000 anaesthetics. *Anesthesiology* 2009; 110:891-7.
11. Parchendekar M, Sonkamble P, Kulkarni S, Deshmukh P, Airway Management in Patients with Difficult Mask Ventilation-2 Case Reports. *International Journal of Science and Research* 2013;4:2237-9.
12. Jayaram K, Gurajala I, Ramachandran G. Difficult mask ventilation made easy: Three cases of Parry Romberg Syndrome. *Indian J Anaesth* 2016;60:280-3.
13. Agrawal P, Gupta B, D'souza N, Bhatnagar N. Fiberoptic bronchoscope assisted difficult airway management in maxillofacial trauma. *Ann Maxillofac Surg*. 2011;1: 95-6.
14. Yun HJ, So E, Karm MH, Kim HJ, Seo KS. Orotracheal intubation in a patient with difficult airway by using fiberoptic nasotracheal intubation: *A case report. J Dent Anesth Pain Med*. 2018;18:125-8.