Video Article

A Novel Rescue Technique for Difficult Intubation and Difficult Ventilation

Maria M. Zestos[1], Dima Daaboul[1], Zulfiqar Ahmed[1], Nasser Durgham[1], Roland Kaddoum[2]

[1]Department of Anesthesia, Children's Hospital of Michigan

[2]Department of Anesthesia, St. Jude Children's Research Hospital

Correspondence to: Roland Kaddoum at roland.kaddoum@stjude.org

URL: https://www.jove.com/video/1421
DOI: doi:10.3791/1421

Keywords: Medicine, Issue 47, difficult ventilation, difficult intubation, nasal, saturation

Date Published: 1/17/2011

Citation: Zestos, M.M., Daaboul, D., Ahmed, Z., Durgham, N., Kaddoum, R. A Novel Rescue Technique for Difficult Intubation and Difficult Ventilation. *J. Vis. Exp.* (47), e1421, doi:10.3791/1421 (2011).

Abstract

We describe a novel non surgical technique to maintain oxygenation and ventilation in a case of difficult intubation and difficult ventilation, which works especially well with poor mask fit.

Can not intubate, can not ventilate" (CICV) is a potentially life threatening situation. In this video we present a simulation of the technique we used in a case of CICV where oxygenation and ventilation were maintained by inserting an endotracheal tube (ETT) nasally down to the level of the naso-pharynx while sealing the mouth and nares for successful positive pressure ventilation.

A 13 year old patient was taken to the operating room for incision and drainage of a neck abcess and direct laryngobronchoscopy. After preoxygenation, anesthesia was induced intravenously. Mask ventilation was found to be extremely difficult because of the swelling of the soft tissue. The face mask could not fit properly on the face due to significant facial swelling as well. A direct laryngoscopy was attempted with no visualization of the larynx. Oxygen saturation was difficult to maintain, with saturations falling to 80%. In order to oxygenate and ventilate the patient, an endotracheal tube was then inserted nasally after nasal spray with nasal decongestant and lubricant. The tube was pushed gently and blindly into the hypopharynx. The mouth and nose of the patient were sealed by hand and positive pressure ventilation was possible with 100% O_2 with good oxygen saturation during that period of time. Once the patient was stable and well sedated, a rigid bronchoscope was introduced by the otolaryngologist showing extensive subglottic and epiglottic edema, and a mass effect from the abscess, contributing to the airway compromise. The airway was secured with an ETT tube by the otolaryngologist.This video will show a simulation of the technique on a patient undergoing general anesthesia for dental restorations.

Video Link

The video component of this article can be found at https://www.jove.com/video/1421/

Protocol

1. An endotracheal tube size appropriate for the patient's age for endotracheal intubation should be chosen. We use the formula: ETT size = age(yr)/4 +4.
2. We chose a one size smaller uncuffed endotracheal tube to be inserted nasally, in case the endotracheal intubation fails after the patient is put to sleep.
3. Before nasal insertion of the tube, we measure the approximate distance from the nose to the level of the vocal cords, which is usually at the level of mid thyroid cartilage.
4. After the patient is anesthetized, and after a failed endotracheal intubation attempt and failed ventilation, the well lubricated one size smaller endotracheal tube will be inserted nasally to a level just above the vocal cords.
5. One has to ensure a good seal of the mouth and nares of the patient. The anesthesia circuit can be attached to the ET tube connector, and with appropriate seal of the mouth and the nose, the lungs can be adequately ventilated.

After sealing the nose and the mouth, lungs are adequately ventilated as confirmed by ETCO2 waveform, chest rising of the patient and good oxygen saturation on pulse oximeter.

Discussion

This technique is comparable to a supraglottic airway device, such as a laryngeal mask airway[1] or a Combitube[2], both of which have been successfully described as rescue techniques in CICV situation to ensure ventilation and oxygenation as nonsurgical technique. This ETT technique however has the ease of availability and readiness, not necessitating any special training or equipment. In cases of CICV, and especially in neonates and small infants, oxygen desaturation can happen very quickly and can be life threatening. This ETT technique can buy

some valuable time by assuring oxygenation and ventilation to the patient, and can bring the saturation of a cyanosed CICV child back to 100%, before another try to intubate is ready to be done.

The limitations of the ETT technique could be the risk of bleeding through nasal insertion of the ETT. This can be minimized by good lubrication of the tube before insertion and the use of a vasoconstrictor agent sprayed in the nostril before insertion of the tube if times allows for that to be done. A gentle rotation of the ETT during insertion can also minimize bleeding. This ETT technique also lacks the ability of protecting the airway against aspiration. Also, the bigger the patient, the more rigid the chest wall, and the more difficult to ventilate the patient using this technique. However, quick desaturation is usually encountered with neonates and smaller children, where this technique works extremely well and can save a life !

Acknowledgements

We would like to thank the anesthesia department at Children's Hospital of Michigan for their efforts and funding of this project.

We would like to thank the BMC department at St Jude Children's Research Hospital for their art work.

References

1. Heidegger, T., Gerig, H.J. Algorithms for management of the difficult airway. *Curr Opin Anaesthesiol* 17(6):483-4 (2004).
2. Krafft, P., Schebesta, K. Alternative management techniques for the difficult airway: esophageal-tracheal Combitube. *Curr Opin Anaesthesiol*. 17(6): 499-504 (2004).

