

MITIGATING “CANNOT VENTILATE, CANNOT OXYGENATE” (CVCO) SCENARIO FOLLOWING ACCIDENTAL TRANSECTION OF THE ENDOTRACHEAL TUBE DURING MAXILLOFACIAL SURGERY

A Case Report

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Abstract

We report a case of accidental transection of a nasal RAE endotracheal tube (ETT) and subsequent management in a 24-year-old male undergoing maxillary and mandibular osteotomy. Forty-five minutes into the procedure, transection of ETT by the surgical drill resulted in a progressive decrease in tidal volumes and a decline in oxygen saturation. After failing to exchange the ETT over a tube exchanger, a soft suction catheter was threaded through the RAE tube to provide oxygenation and borrow time to re-intubate through the opposite nostril. Suction catheter is a viable tool to maintain oxygenation and mitigate “Cannot Ventilate, Cannot Oxygenate” scenario during accidental transection of ETT.

Key words

Endotracheal tube, nasal intubation, airway, suction catheter

Case Presentation

A 24-year-old male patient with a BMI of 33.2 kg/m² was scheduled for elective maxillary and mandibular osteotomy to correct under bite with malocclusion. Medical history was significant for obstructive sleep apnea and asthma and airway exam revealed a Mallampati Class III. Pre-oxygenation was done with 100% oxygen for 3 minutes. With emergency airway equipment available, patient was induced with midazolam 2mg and propofol 200mg. Mask ventilation was found to be difficult, and needed two person ventilation with an oral airway. Sevoflurane was started to deepen the level of anesthesia and succinylcholine 100 mg was given to facilitate intubation and a nasal RAE endotracheal tube was placed without difficulty. Anesthesia was deepened to 1.6 MAC using sevoflurane and fentanyl 100 mcg was administered for analgesia. Upon checking the twitch recovery from succinylcholine, rocuronium 50 mg was administered. Anesthesia was maintained with 40% oxygen, air and sevoflurane. Forty-five minutes into the surgery, a progressive decrease

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in end-tidal carbon dioxide (EtCO₂) as well as tidal volumes were noted. A distinct smell of sevoflurane was also observed from the surgical site. Gradually the leak increased to the point where the ventilator bellows failed to rise and desaturation was noted. The lowest EtCO₂ and SpO₂ levels noted during the incident were 10 mm Hg and 80% respectively. This demanded an expedited differential diagnosis of decreased EtCO₂ and tidal volume leading to desaturation. The surgeon was informed of the situation and told to stop the procedure. The nasal RAE tube was inspected and partial transection, apparently made by surgical drill, was noted (Figure 1). Patient's head was placed in neutral position in an effort to improve ventilation which did not improve. Hand bag ventilation was attempted but was inadequate due to the patient's body habitus. Airway was suctioned and noticeable amount of blood was evacuated from the patient's mouth. Tube-exchange was attempted, but was found to be too stiff

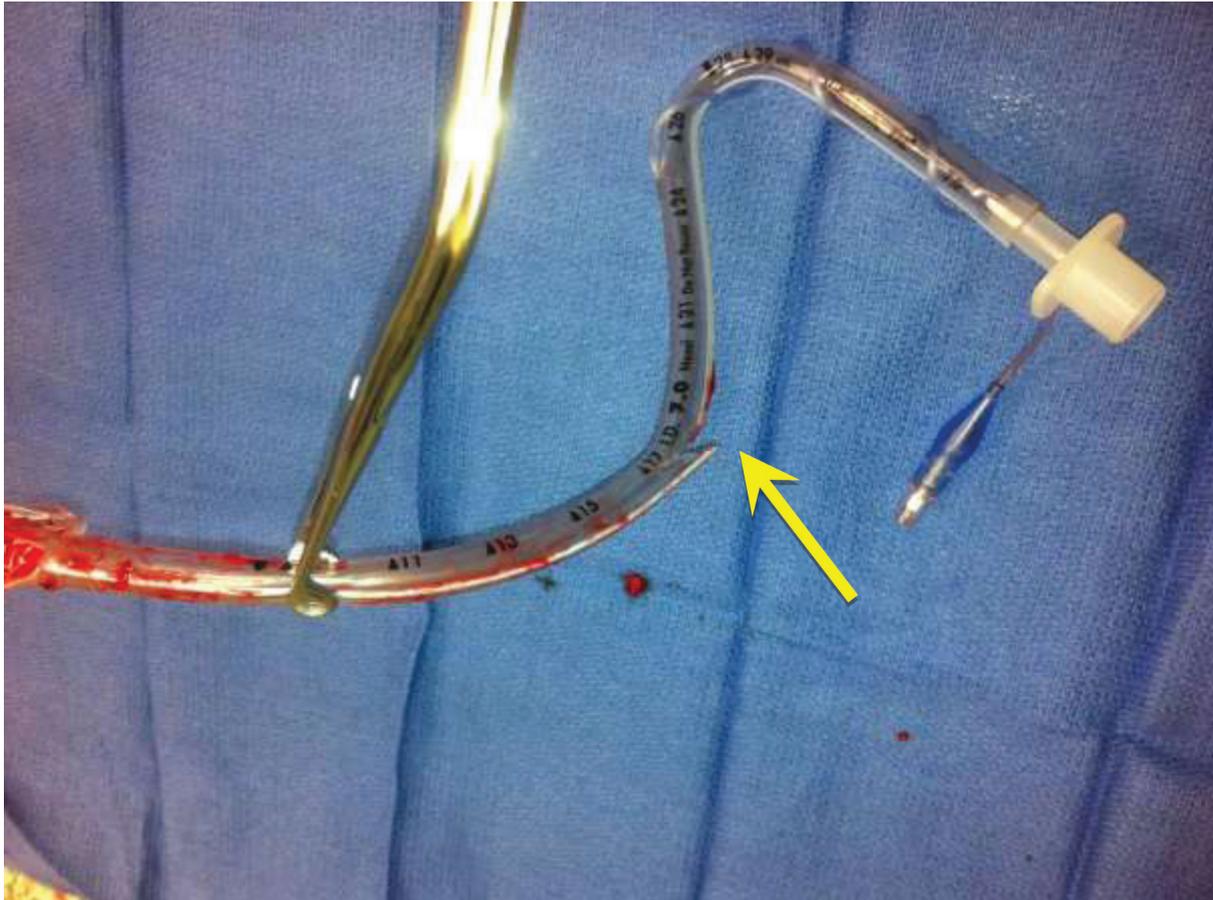
to maneuver in the curved RAE tube. A soft suction catheter was then threaded through the ETT which provided oxygen flow to the lungs. Oxygen flow of 6 L/min was delivered into the catheter and saturation was maintained above 90% at all the times. A 7.0 mm nasal ETT was then passed through the opposite nostril. Under direct visualization, the original ETT was withdrawn and the new one was passed without difficulty. Surgery was successfully completed and patient had an uneventful perioperative course.

Discussion

The difficult airway algorithm is a paramount importance to anesthesiologists during the management of anticipated or unanticipated difficult airways^{1,2}. Nevertheless, more complex maneuvers maybe involved if the ETT is dislodged in the middle of a complex maxillofacial surgery. Recognition of an

Fig. 1

Nasal Rae endotracheal tube. Yellow arrow points to the area of the accidental cut by the drill.



unsecure or suboptimal airway might also be delayed as the airway is in possession of the oral surgeons. If ETT damage is suspected, quick evaluation of the adequacy of ventilation should be performed. In case of partial tube damage, airway patency can be maintained by stabilizing the ETT and laryngeal packing³. In a case report by George et al, adequate ventilation was achieved by keeping the patient's head in neutral position throughout the surgery⁴. However, failure to adequately ventilate the patient necessitates immediate measures to establish a patent airway and emergency airway kit should be made readily available including surgical airway access which is the ultimate solution if all the measures fail⁵. Since the patient's airway is in the operative field, is often bloody, filled with debris from the operation, and altered by surgical manipulation, it may be difficult to replace the damaged ETT. Tube exchange can be done by using exchange catheters without losing the airway which also provide oxygenation. In a previous case report smaller tracheal tube through the partially damaged tube has also been attempted to provide adequate ventilation while awaiting reintubation⁶. In our case, tube exchange was attempted using tube exchange catheter but was found to be too rigid to maneuver through the curved nasal

RAE tube. Rapid desaturation combined with inability to provide adequate bag mask ventilation created "Cannot Ventilate, Cannot Oxygenate" (CVCO) scenario which necessitated for emergency plans to provide immediate oxygenation. Therefore, readily available soft suction catheter was passed through the RAE tube which resulted in adequate oxygenation and provided time to successfully manage the lost airway by re-intubating through the opposite nostril under controlled condition with minimum interruption in oxygenation.

Conclusion

Maxillofacial surgeries present a special challenge to the anesthesiologist. We managed a case of lost airway and desaturation in a patient with difficult airway using soft suction catheter passed through the damaged nasal RAE tube to provide oxygenation and then re-intubating through the opposite nostril under controlled conditions. Therefore, suction catheter is a viable tool to maintain oxygenation and mitigate CVCO scenario during accidental transection of ETT.

References

1. SCHÄUBLE JC, HEIDEGGER T: Management des schwierigen AtemwegsManagement of the difficult airway. *Anaesthetist*; 2018, 67:725-737.
2. APFELBAUM JL, HAGBERG CA, CAPLAN RA, ET AL: Practice Guidelines for Management of the Difficult Airway. *Anesthesiology*; 2013, 118:251-270.
3. MAYORAL ROJALS V, CASALS CAUS P: 2 different solutions to a severed nasotracheal tube during maxillary osteotomy. *Rev Esp Anestesiol Reanim*; 2002, 49:201-204.
4. GEORGE P, FIADJOE JE, SIMPAO AF: An Unusual Lacerated Tracheal Tube during Le Fort Surgery: Literature Review and Case Report. *Case Rep Anesthesiol*; 2016, 2016:1-4.
5. Anesthesiologists A society of. Practice Guidelines for Management of the Difficult Airway. *Anesthesiology*; 2013, 118:251-270.
6. PESKIN RM, SACHS SA: Intraoperative Management of a Partially Severed Endotracheal Tube during Orthognathic Surgery. *Anesth Prog*; 1986, 33:247-251.