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Case Report

Damage to endotracheal cuff inflation tube by harmonic scalpel in tonsillectomy leading to compromised airway

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Abstract

Use of harmonic scalpel has increased in the recent past for different surgical procedures. We report a case of damage to an endotracheal tube inflation line in a 47 year old female patient who underwent elective tonsillectomy due to harmonic scalpel. Pre-anaesthetic evaluation of the patient revealed no abnormalities. The patient's trachea was intubated via nasal route with a cuffed north facing Ring, Adair and Elwyn tube of 7.0 mm internal diameter. The cuff was inflated after confirmation of tracheal placement of tube and pharyngeal packing was done. After 30 minutes of surgery, the bellows of the ventilator were collapsing. Suspecting a leak an attempt was made to inflate the cuff, which revealed high resistance in inflation tube. Surgeon was immediately asked to stop the surgery. Check laryngoscopy revealed damage to cuff inflation tube which was sealed by harmonic scalpel in semi-inflated condition. Anticipating that the tracheal extubation in that inflated position would result in vocal cord trauma, a 23 gauge spinal needle attached to 5ml syringe was introduced under direct laryngoscopic guidance. The cuff was punctured and air aspirated so as to deflate the cuff. The tube was taken out and was replaced. The surgery continued for next one hour, was uneventful and trachea extubated at completion.

Keywords: airway management; anaesthesia; complications; endotracheal tube

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Introduction

We report a case of sudden ventillatory insufficiency due to damage of an endotracheal tube cuff inflation tube during tonsillectomy. Such complications have rarely been reported but with introduction of newer technology like harmonic scalpel, they may occur. Air leaks may exist in the ventilator[1], the pressure monitoring line[2], and the breathing elbow[3]. The site of cuff inflation tube insertion site is vulnerable to tear which can be detected only if high degree of suspicion and proper inspection of tube prior to insertion.

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Case Report

A 47 year old female, weighing 53kg, American Society Anaesthesiologists physical status I, was posted for elective tonsillectomy. Patient's pre-anaesthetic evaluation revealed no abnormalities. After obtaining written informed consent for anaesthesia, Intravenous line was secured and ECG, pulse oximetry, and non-invasive blood pressure monitors were attached. After preoxygenation, anaesthesia was induced with fentanyl 100 mcg, lidocaine 30 mg, propofol 110 mg and rocuronium 35 mg. Tracheal intubation was done via nasal route with cuffed RAE tube ID 7.0 mm. Tracheal placement was confirmed by auscultation and pharyngeal packing was done. Patient was mechanically ventilated on pressure controlled mode with an inspiratory pressure of 12 cmH2O. Anaesthesia was maintained with Sevoflurane 2 vol.%, oxygen in air (FiO2 = 0.5) with end-tidal CO2 between 35 and 40 mmHg.

Half an hour after start of the surgery, the tidal volume suddenly decreased to 200 ml with an inspiration pressure set to 18 cmH2O, and the bellows were partially collapsed. There was no change in hemodynamics. Suspecting a leak, patient was switched immediately to manual ventilation and oxygen flow was increased. We were unable to inflate the pilot balloon; hence, reintubation was planned under the suspicion of damage to the endotracheal tube cuff. Check laryngoscopy was done and damage to endotracheal tube cuff inflation tube was found but the cuff was semi inflated.

Anticipating that the tracheal extubation in that inflated position would cause vocal cord trauma. A 23 Gauge spinal needle attached to 5ml syringe was introduced under direct laryngoscopic guidance. The cuff was punctured and air aspirated so as to deflate the cuff. The tube was taken out and patient maintained on face mask ventilation. Reintubation was done under direct laryngoscopy by lifting the surgical drape over patient's head. The elapsed time was approximately two minutes for this process. Maximum end tidal CO_2 immediately after intubation was 38 mmHg and oxygen saturation did not fall below 98%. The damage of the endotracheal tube inflation tube was confirmed after removing it from patient's trachea (Figure 1). After reintubation, the surgery was uneventful and on completion standard technique of reversal of neuromuscular blockade and extubation of trachea was performed. In the PACU, there were no complaints of cough, dyspnoea, chest pain, oxygen desaturation or bleeding. Clinical signs and radiological evaluation with chest X-ray done later had no signs of aspiration.

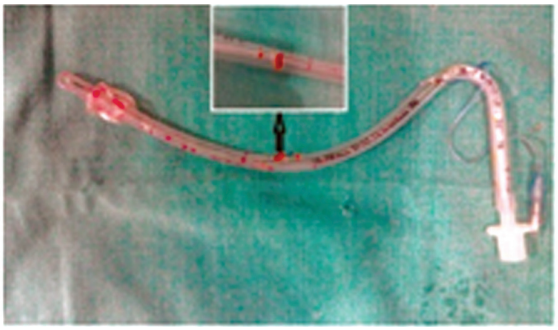

Figure 1: Damage to cuff inflation tube by harmonic scalpel

Discussion

Anaesthesiologist's limited access to the patient's and shared airway can cause a delay in treating emergencies occurring during anaesthesia. We should be prepared and have a backup plan in case of intraoperative airway compromise. Blood in the oropharynx has potential for aspiration, blocks the laryngoscope and fiberoptic scope light source. The laryngeal mask airway and other nonsurgical emergency ventilation options, such as transtracheal jet ventilation, also carry the risk of aspiration and compromised airway.[4] We recommend that during the routine check laryngoscopy in such scenario we should also focus at endotracheal cuff inflation tube. A published analysis of ETT leakage has revealed that when mechanical defects were present; it mostly involved the cuff or pilot valve.[5] Manufacturing defects include cuff defects leading to herniation and intra-luminal tracheal obstruction[6], elliptical defects in the tube wall at the level of the notch cut for insertion of the pilot tube causing air leak[7,8] and intra-luminal plastic films and meniscus[9] causing near complete airway obstruction. In our case, the abrupt onset of ventillatory failure and the observation of harmonic scalpel burn and damage to inflation line on the endotracheal cuff were sufficient to prove the causal reason for the intraoperative event. Securing the airway was the primary concern at that time. If in such situation, as in this case, an option is to puncture the cuff with a long spinal needle under laryngoscopic guidance and air can be aspirated. Thus, we can avoid the additional risk of vocal cord trauma caused by semi- inflated cuff during tube exchange.

Conclusion

Perhaps our experience could work as an incitement to start further investigations and more vigilance when a similar situation arises. It also highlights the role of a vigilant clinician in detection of such errors and thereby avoiding anaesthetic mishaps. The saying "if in doubt, take it out" may still hold true.

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