

# PARTIAL AIRWAY OBSTRUCTION IN A PATIENT WITH OCCLUDED REINFORCED ENDOTRACHEAL TUBE

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## Abstract

Reinforced Endotracheal Tube (RETT) aids in airway management in a variety of surgical techniques requiring flexion of neck, prone positioning, surgeries involving neck, face and airways. Unlike normal endotracheal tube, RETT has a metal wire embedded throughout its shaft. However, RETT is not an alternative for bite block. Once RETT is bitten, it does not return back to its original contour and may cause tube occlusion. RETT should be replaced by ordinary endotracheal tube whenever patient needs postoperative ventilation. There is a finite chance of obstruction of RETT because of repeated bites in conscious and awake patients; unless an airway or bite block has been placed in situ. In this report, we describe an incident of RETT blockage in an adult patient who had overnight postoperative elective ventilation following an elective surgery. This report emphasizes the need for taking an extra caution while ventilating a patient on RETT.

**Keywords:** reinforced endotracheal tube; airway obstruction; weaning.

## Introduction

Reinforced Endotracheal Tube (RETT) is extremely useful in securing airway for a variety of surgical techniques requiring flexion of neck, prone positioning, surgeries involving neck, face and airways. Unlike normal endotracheal tube, RETT has a metal wire embedded throughout its shaft and its connector is firmly attached to the shaft. RETT can bend at any angle and usually require a stylet to aid intubation. In spite of having embedded metal wire, RETT is not an alternative of bite block. Once RETT is bitten, it never returns back to its normal contour and even an obstruction can occur.<sup>1</sup> We describe an unusual presentation of airway obstruction secondary to a partially occluded RETT in an adult patient who was subjected to overnight elective ventilation.

## Case report

A 78-year-old well and fit gentleman, weighing 62 kg, American Society of Anesthesiologists physical status classification 2 was planned for Hartmann's procedure. Preassessment predicted anticipated difficult intubation with barely two-finger breadth mouth opening, Mallampati 3 and facial deviation due to previous radical neck dissection. In preoperative team, briefing surgical team requested for jack knife positioning for Transanal Total Mesorectal Excision (TaTME) of rectum.

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Anesthesia was induced with fentanyl, propofol, and trachea was intubated using rocuronium. Tracheal intubation was performed using RETT (8.0mm internal diameter) in view of jack knife position for surgery. Video laryngoscope was used for intubation. View of glottis was found to be Cormack-Lehane 3. RETT position was confirmed with end tidal carbon dioxide monitoring and bilateral auscultation. It was fixed at 21cm at the lip. Anesthesia was maintained with air, O<sub>2</sub>, infusions of propofol, remifentanyl and intermittent boluses of rocuronium. The surgical technique was initially laparoscopic but afterwards was converted to open approach and TaTME of rectum was carried out keeping the patient in lithotomy position. Patient was hemodynamically stable throughout the surgery. Surgery was continued over a period of 11 hours. Because of long duration of procedure, the patient was kept electively intubated and ventilated overnight in the intensive care unit (ICU).

In the ICU ventilation was continued on Duo-PaP mode (FiO<sub>2</sub> 0.35, PEEP 5cm H<sub>2</sub>O, Pressure Support 15cm H<sub>2</sub>O), with a sedation target of -3 on Richmond Agitation and Sedation Scale. The RETT position was confirmed with chest X-ray in the ICU. The next morning the sedation was discontinued, weaning started, and a plan was made for extubation. However, in the spontaneous mode of ventilation his airway pressure was gradually increasing. At the same time, the patient became slightly tachypnic (respiratory rate up to 24/min). Oxygen saturation by pulse oximetry (SpO<sub>2</sub>) was between 96-98% with 35% oxygen. RETT position was checked and tube displacement was

ruled out. A suction catheter could be passed through the RETT with mild difficulty. Initial impression was an obstruction in RETT. Meanwhile, the patient became fully conscious and oriented, and therefore extubation was planned. Extubation was carried out, keeping all preparations for emergency reintubation in a predictable difficult airway situation. Following extubation, the patient remained vitally stable, breathing normally with O<sub>2</sub> through facemask and his tachypnea settled on its own. On a closer inspection the RETT tube was found partially blocked at the level of incisors (20 cm mark) (Figure 1).

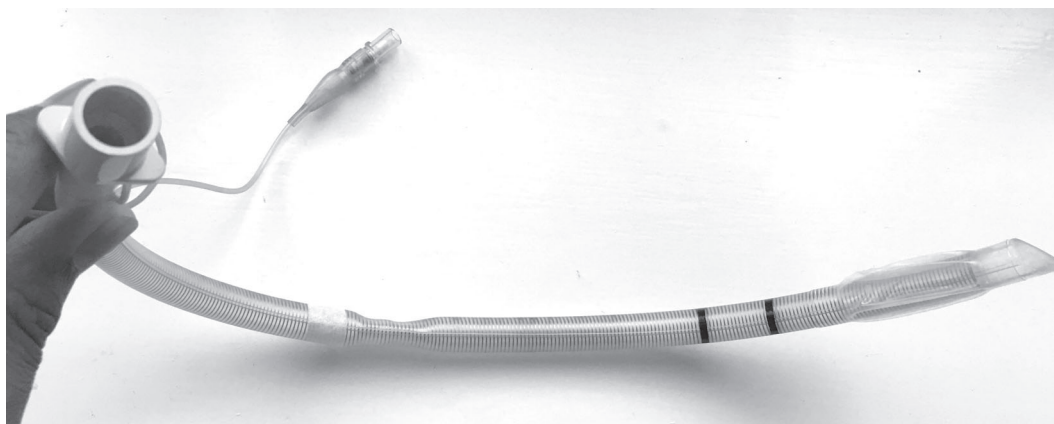
## Discussion

RETT is very useful aid of airway management for a variety of surgical techniques requiring flexion of neck, prone positioning, surgeries involving neck, face and airways. Unlike normal endotracheal tube, RETT has a metal wire embedded throughout its shaft to which the connector is firmly attached. RETT can bend at any angle and usually require a stylet to aid intubation. In spite of having embedded metal wire, RETT is not an alternative of bite block. Once RETT is bitten, it never returns back to its normal contour and even an obstruction can occur.<sup>1</sup>

RETT should be replaced with ordinary endotracheal tube (ETT) whenever patient needs postoperative ventilation in the ICU. There is a finite chance of obstruction of RETT because of repeated bites unless an airway or bite block is placed

*Fig. 1*

*Partially occluded reinforced endotracheal tube following repeated bites*



*Fig. 2*  
*Internal appearance of the partially blocked*  
*reinforced endotracheal tube*



concomitantly. Obstruction of RETT has been well described in the literature.<sup>2</sup> Most common cause of obstruction is repeated usage and use of nitrous oxide that may cause dissection of RETT.<sup>3</sup> There could be development of bubbles in the wall of the RETT owing to ethylene oxide sterilization or repeated usage.<sup>4</sup> However, nowadays use of nitrous oxide has fallen out of favor and in most parts of the world single use RETTs are the norm.

In this particular patient, we used RETT because of particular surgical positioning. Apparently, the RETT was not exchanged for a normal ETT as the intubation was difficult and only short period of overnight ventilation was decided. In the next morning, during weaning, high airway pressure was detected. Negotiation of the suction catheter through RETT was difficult and air entry was found reduced bilaterally. We anticipated some obstruction in RETT. Extubation was made at the right time; following extubation the

obstruction was found at the level of teeth. The tube was bitten by the patient when he became awake. We had a review of the internal diameter of the tube after extubation with a fibre optic bronchoscope (Figure 2).

One should be extremely careful while using RETT, particularly for the possibility of tube blockage by repeated bites. One could use bite block and titrated sedation to prevent blockage. Whenever a patient on RETT tube needs long or short-term ventilation following surgery, RETT should be exchanged with a normal ETT. An increased airway pressure in a patient with RETT should raise the possibility of tube blockage. A bronchoscopic examination may aid in diagnosis of such tube block.

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