

Short Report

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Airway leak from incidental esophageal probe placement into the trachea around the endotracheal tube: A case report

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Abstract

Air leaks in the ventilatory circuit pose a significant challenge in anesthesiology and critical care settings, originating from several common and uncommon causes. In this case report, we highlight an unusual instance of air leakage attributable to the incidental insertion of an esophageal temperature probe into the trachea. Video laryngoscopy played a pivotal role in diagnosing the air leak. It is imperative for anesthesiologists to consider all oral and nasal devices in case of circuit leakage.

Introduction

Leakage in the ventilatory circuit is a significant safety concern in anaesthesiology that can lead to hypoventilation, hypoxia, awareness during surgery, pollution of the operating room, and potentially death. Therefore, preoperative testing, maintenance of the anesthesia circuit, vigilant monitoring, and prompt action to any suspected leak is crucial. These measures mitigate anesthesia-related risk and uphold patient care. In addition to common causes of leaks faced intraoperatively (underinflated endotracheal tube cuff, damaged or weak connections in the circuit, etc), some uncommon cases have been reported in the past as well. These include malfunctioning ventilators [1], incorrectly installed canisters [2], defective vaporizers [3], and even faulty endotracheal tubes [4]. However, most of the leaks can be detected by completing comprehensive preoperative assessments. We describe an interesting case of an intraoperative air leak that was hard to locate and unpreventable by standard preoperative testing.

Case report

The patient is an 84.1 kg, 175.26 cm 77-year-old male with a past medical history of carotid artery stenosis, hypertension, hyperlipidemia, GERD, and bladder neoplasm that presented for elective transurethral bladder tumor resection. ECG revealed sinus bradycardia with premature atrial contractions and echocardiography revealed preserved ejection fraction and function. Pre-operatively labs revealed a hemoglobin of 9.2 mg/dL but were otherwise unremarkable with normal vital signs. The patient was given midazolam (0.5 mg), fentanyl (125 µg), lidocaine (90 mg), propofol (120 mg), and rocuronium (50 mg). Following easy bag-mask ventilation an 8.0 ETT was smoothly placed with a grade 2a view utilizing a MAC 3.0 laryngoscope. Cuff insufflation with 10 mLs of air preceded confirmation with equal bilateral breath sounds end-tidal capnography. Using the Dräger Perseus A500 ventilator, he was placed on volume control with TV 450 mL, PEEP 5 cm H₂O, RR 15 bpm with no evidence of circuit leak. An esophageal temperature probe was placed orally with no resistance. The ventilator alarm signaled

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a circuit leak with an abrupt decrease in tidal volume from 465 mL to 169 mL, and end-tidal CO₂ decreased from 28 mmHg to 0 mmHg with no loose connections identified. Upon oral auscultation with a stethoscope, a bubbling noise was heard. Insufflation of the cuff with an additional 2 mL later followed by another 2 mL did not resolve the leak. With manual ventilation, we were unable to achieve sustained sufficient tidal volumes. We then visualized the ETT with video laryngoscopy with a McGrath blade 3 and visualized the esophageal probe entering the glottis around and above the ETT (Figure 1). Upon removal of the esophageal probe, the air leak immediately resolved, and the target tidal volume was achieved. Following the case, the patient was extubated and taken to PACU without complications and was discharged to home the same day.



Figure 1: Esophageal probe inadvertently placed into trachea around ETT cuff.

Discussion

A persistent air leak that is identified intraoperatively is often evaluated by analyzing the circuit starting at the patient or ventilator end. Connections from the end-tidal CO₂ sampling line and ETT should be checked to ensure no open links or manufacturing defects. Moving toward the patient, oral auscultation with a stethoscope can identify the presence of an air leak through a bubbling noise, with common etiologies including cuff underinflation or structural damage [5]. While we did not measure the ETT cuff pressure, inflating the cuff pressure between 20-30 cm H₂O can also ensure proper inflation and integrity [6]. If these attempts are unable to find the source of the air leak, visual inspection can help elucidate malpositioning such as partial migration of the ETT cuff outside of the trachea or other uncommon causes [5], potentially avoiding replacement of the ETT [7]. Video laryngoscopy should be preferred over diagnostic laryngoscopy due to improved laryngeal view [8], as demonstrated in a case when an esophageal probe was only discovered entering the glottis using video laryngoscopy but not by direct laryngoscopy when the ETT was exchanged [7].

There have been scarcely reported cases of esophageal probes incidentally placed into the trachea, but with increasing use of esophageal probes in the ORs, it is imperative to include them as part of the differential diagnosis [7,9]. Any persistent leak after placement of an esophageal temperature probe combined with decreased end-tidal CO₂ should prompt further investigation with video laryngoscopy prior to exchanging the ETT.

It is important to include video laryngoscopy as a tool to further investigate uncommon causes of persistent air leaks, especially prior to exchanging the ETT as this may cause increased morbidity in patients with challenging or difficult airways. Any tube placed orally or nasally such as an esophageal temperature probe tube can result in an air leak and should be included as part of the differential diagnosis.

Conflicts of interest: The authors have no conflicts of interest.

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