

CASE REPORT

A case report on leakage through endotracheal tube due to unnoticed manufacturing defect

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Leakage around an endotracheal tube is a common problem in the intensive care unit or operation theatres. A wide range of consequences can result if the leak is not properly managed. Tracheal re-intubation because of air leak after a successful tracheal intubation is quite common in practice

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INTRODUCTION

It is frequently observed in practice that after successful intubation of trachea, re-intubation is required due to air leak. This air leak can be due to defective spring-loaded inflation, pilot balloon, and cuff or inflation tube/lumen. In this case, we report a significant air leak due to fault in the standard quality of endotracheal tube, with no defect in cuff inflation system.

CASE REPORT

The 38-year-old female patient, ASA Grade I came to outpatient department with complaint of pain in right upper abdomen

since 2 months, which was sudden in onset, localised to right side of upper abdomen, intermittent type, moderate in intensity, colicky in nature, was associated with nausea, aggravated after taking heavy meals and relieved on taking medication. Patient also complained of vomiting since 3 months, 3 to 4 episodes each day. Vomitus contained the ingested food material, was non-projectile. There is no history of fever, weight loss, yellowish discoloration of skin, itching or constipation. The patient was thin built with weight of 48 kg. All the routine investigations were normal except for hemoglobin which was 8 g/dL. Two units PRBC were transfused before surgery. The patient was planned for elective laparoscopic cholecystectomy. Pre-oxygenation was done. Premedication was done with injection glycopyrrolate 0.2 mg IV, injection midazolam 1 mg IV, and injection butorphanol 1 mg IV. Induction was done with injection propofol 80 mg IV and relaxant injection vecuronium 5 mg IV. After 3 min of bag and mask ventilation, the patient was intubated with endotracheal tube of size 7.0 mm internal diameter which was fixed with dynaplast at a length of 21 cm on the endotracheal tube. After the positioning of the patient was done, an air leak was audible from the mouth as gurgling sound.

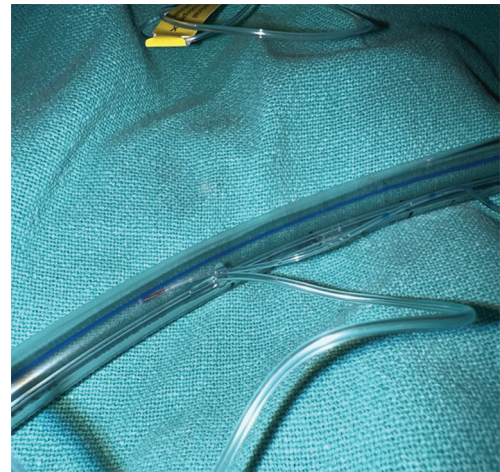
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MANAGEMENT

To rule out the cause and fix it, we followed a series of steps. At first, we decided to check for any defect in cuff or inflation valve by inflating the pilot balloon with 2 mL of air (apart from the air filled initially). Since the pilot balloon was able to hold air, it was concluded that the cuff was intact and inflation valve was competent. Further, the integrity of the cuff and inflation assembly was checked by cuff pressure manometer, which showed a reading of 22 cm of H₂O. Moreover, after each positive pressure breath, the sound of air leak was still detectable. This was followed by assuring the current location of tracheal tube with direct laryngoscopy which assured that the whole cuff was further down the vocal cord.

The next step was to introduce a new endotracheal tube because we were unable to rule out the reason for the air leak and anticipated that the tube may be smaller in relation to the patient's trachea. However, we noticed that when we auscultated the patient's trachea, no sound was heard. No air leak was audible when the ETT was changed. After the procedure was finished, the patient was extubated, and then, we placed both endotracheal tubes side by side to determine the source of the air leak. Upon closer analysis, we found a minor flaw near the inflation tube's insertion site in the first ETT. This flaw allowed air to escape through the tube's wall when the first ETT was being used.



DISCUSSION

When bubbles are visible coming from the oral and nasal cavities while secretions are present, a cuff leak or leak surrounding the cuff is suspected. This suspicion is confirmed by tracheal auscultation, probing of the cuff over the suprasternal area, and analysis of the pilot balloon. Since the inflated tube's take-off point is far from the incisor and probably above the secretion that has been gathered, this causes the bubbles to form.

Unexpected air leaks during tracheal intubation have been linked to improper adhesive plaster attachment,^[1] frequent use and attempts to remove the adhesive plaster,^[2] chewed notch on re-sterilized tube,^[2] and low product quality compliance.^[3] Standard *in vitro* testing frequently fails to identify this kind of occult leak. However, according to one author, inspecting the endotracheal tube when it is bent in the opposite direction of its usual curve and submerged in water can reveal a hidden leak. According to studies, improper positioning of the ETT is the main reason for leakage.^[4] Although mechanical flaws are common, touching the tube with the teeth while using it can harm it.

CONCLUSION

Any sort of ETT has the potential to leak air. Both newly made and previously used ETT may have the flaw that results in an air leak. Even *in vitro* tests frequently miss the microscopic slits and holes on the ETT's surface or at the place where the pilot balloon's inflation line enters. We should be aware that even a small air leak at the beginning of a surgical procedure can result in harmful underventilation. As a result, anesthesiologists should be aware of these disorders and make a diagnosis to determine whether a tube replacement is necessary.

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