

## CORRESPONDENCE

## AIRWAY MANAGEMENT

## Persistent air leak with intact inflation system of endotracheal tube

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**ABSTRACT**

Disposable endotracheal tubes are being mass-produced with PVC material. Although it is a rare finding that an endotracheal tube may have a manufacturing defects, sporadic case reports published in scientific journals draw our attention, that although rare, yet this possibility must be kept in mind by every clinician who intends to intubate a patient. The tube must be thoroughly checked before insertion, and any inadequacy in ventilation after insertion, must prompt us to recheck the breathing system, which may have to be replaced.

**Keywords:** Defective material; Endotracheal tube; Manufacturing defects

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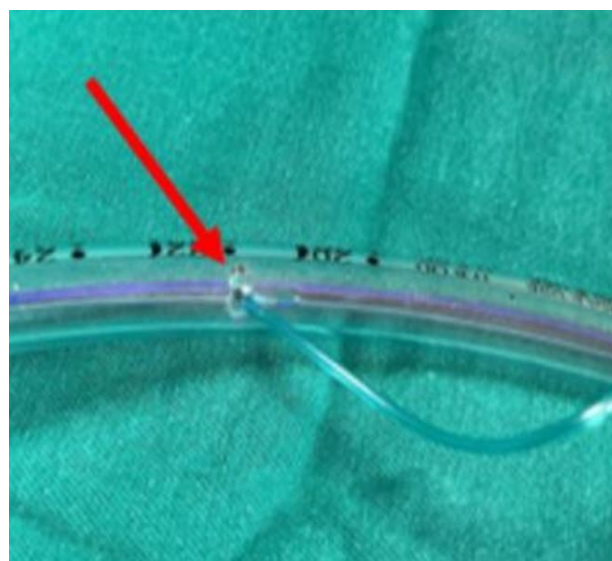
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Securing the airway using an endotracheal tube (ETT) represents a pivotal aspect of general anaesthesia practice. Anaesthesiologists frequently encounter manufacturing defects in ETT like defect in the one-way inflation valve, inflation tube, pilot balloon and cuff etc.<sup>1-4</sup> These can often be identified through visual inspection and cuff inflation testing prior to insertion. Nevertheless, certain manufacturing defects in ETT might elude detection prior to intubation. Presented herein, is a case in which an air leak occurred after insertion, though the ETT inflation system had been checked and found to be satisfactory prior to intubation.

A 58-year-old female patient underwent a routine radical mastectomy with axillary clearance under general anaesthesia. After induction of anaesthesia and administration of neuromuscular blocking agent, intubation was executed using a 7.0 mm internal diameter (ID) endotracheal tube. The cuff was inflated and the tube was secured at 20 cm mark. Post intubation an audible leak was heard from patient's airway and the desired tidal volume which was set at 400 ml was not achieved. Assuming a smaller tube size might be the cause and there might be leak along the edges of cuff, an additional 2 ml of air was introduced into the pilot balloon. Pilot balloon pressure was measured at 28 cm of water via an aneroid manometer. However, the leak persisted. Video Laryngoscopy confirmed the proper position of the cuff, with the black mark situated just beyond the vocal cords. The entire ventilation circuit was checked for leaks but none was found. A decision was made to replace the endotracheal tube with a new one of the same ID. After cuff inflation and pressure check, no further leaks were

observed, ensuring satisfactory ventilation throughout the procedure.

Initial examination of the original ETT revealed no visible defects. ETT was examined by submerging the tube underwater with the distal end occluded and the proximal end connected to an Ambu bag. It revealed bubbling near the point where the inflation line enters the ETT (Image 1). Such small defects often escape visual detection as well as when checked by inflating the cuff of ETT. The reinsertion of ETT prevented any potential harm to the patient and surgery proceeded uneventfully.



**Figure 1:** Arrow show the point of leakage

Pasupuleti et al. reported an air leak case with an intact cuff system involving a disposable 7mm flexometallic ETT.<sup>5</sup> They identified a defect near the insertion of the inflation tube on the ETT, which became more pronounced when the tube was straightened. These reports underscore that such defects may be present across various ETT types and might not become evident even after thorough inspection, emphasizing the importance of a systematic approach in diagnosing and addressing the leak's cause.

Leaks with an intact system can be due to cephalad migration of ETT, insufficient cuff inflation, insertion of an undersized tube, irregular cuff shape, or high peak airway pressure.<sup>6,7</sup> Recently a leakage of the inflation channel well before the balloon in an armoured ETT was reported.<sup>7</sup> If a leak is detected, a systematic approach should be followed to determine the leak's site. This includes checking for cuff deflation. If the cuff system is normal, ETT position should be verified through laryngoscopy/bronchoscopy. Over-inflation of the cuff can be attempted if leaks around the cuff are identified. Airway packing and reducing peak pressure are also options. If the leak persists, ETT replacement during surgery is warranted as was done in the present case.

#### Conflict of interest

Nil declared by the authors.

#### Ethical issues

No ethical issues were involved; consent of the patient was not required.

#### Author contribution

All authors took equal part in the preparation of this manuscript.

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