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Short Communication

The eye of the storm: bemusing the cause of the intraoperative conundrum!

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Dear Editor,

The Murphy's eye is an extra hole on the side of an endotracheal tube (ETT), which allows gas flow in case of obstruction in the central opening. We write this short communication to report a near-miss incident associated with Murphy's eye. Informed written consent was obtained to publish this article.

The incident occurred to a 57-year-old, 110 kg (body mass index 40.38 kg/m^2) lady, posted for L4-L5 spinal decompression and fusion. She had hypertension, diabetes mellitus, and obstructive sleep apnea and was on regular medication and bi-level positive airway pressure therapy. A standard general anesthetic induction, following pre-oxygenation, was undertaken using propofol, fentanyl, and rocuronium. Tracheal intubation was achieved using a 7.5 mm internal diameter (ID) reinforced cuffed ETT (RuschFlex, Teleflex Medical Sdn. Bhd., Malaysia) with a Cormack-Lehane grading II. The ETT was securely fixed at the 20 cm mark at the incisors after checking for bilateral equal air entry. She was put on mechanical ventilation (volume control mode) with a FiO2 of 1, tidal volume of 500 ml, PEEP of 5 cm H_2O, and frequency of 12/min. The peak airway pressure (P_{peak}) and the oxygen saturation (SpO2) were 25 cm H_2O and 100%, respectively. The patient was then turned prone over bolsters and head cushion for surgery. Fifty minutes after the skin incision, there was a sudden increase in P_{peak} and $EtCO_2$ to 45 cm of H_2O and 40 mm of Hg, respectively. First, adequate depth of anesthesia, and patency of the ventilatory circuit were ensured. Although no additional sound was heard on auscultation, rising P_{peak}, $EtCO_2$, and a tight reservoir bag with low compliance led to the suspicion of endobronchial migration of ETT, intraluminal obstruction, or bronchospasm. Hence, surgeons were requested to expedite the procedure. Meanwhile, a chest x-ray was taken with C-arm, and the ETT tip was found to be above the carina, thus ruling out the possibility of endobronchial migration. After fifteen minutes, the P_{peak} further increased to 48 cm of H_2O with FiO2 of 0.6, EtCO2 45 mm Hg, SpO_2 93%. Hence, FiO_2 was increased to 1, RR to 18 breaths per minute, and salbutamol and budesonide were administered using an in-line nebulizer. However, we did not notice any improvement.

After about 10 minutes, P_{peak} reached to 50 cm H_2O with FiO_2 requirements of 1 to keep saturation above 95%. We had suspected a possible tube blockage due to secretion or intraoral kinking. Hence, a sterile 12 Fr suction catheter was inserted but could not be negotiated through the ETT. After completing the skin suture and applying the sterile dressing, the patient was turned supine. The P_{peak} remained the same at 50 cm H_2O with SpO_2 around 90%. Immediately. videolaryngoscopy was performed with C-MAC® Macintosh blade size 3, and the ETT was removed, and a new cuffed 7.0 mm ID ETT (RUSCHELIT safety clear

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plus, Teleflex Medical Sdn. Bhd., Malaysia) was inserted. It was connected to the ventilator, and the P_{peak} was observed to decrease to 25 cm of H_2O, and SpO_2 improved to 100% after a minute. On auscultation, the chest was clear and had equal air entry on both sides. The patient was ventilated for another 30 minutes, and then the trachea was successfully extubated. The patient was in the high dependency unit for 24 hours and then shifted to the ward.

The removed armored ETT was examined thoroughly to determine the reason for intraoperative turmoil. A bougie was negotiated without hindrance through the distal end, ruling out any intraluminal obstruction. However, abundant thick secretions were present inside. The tube was examined against a blue drape sheet, and Murphy's eye-opening was found to be sealed; the plastic overlay that had to have been cut out to form Murphy's eye was still in place (Figure 1 A). We proceeded to cut the plastic disk out of its stenciled outline for demonstration (Figure 1 B). Retrospectively, it was surmised that Murphy's eye had not been cut away completely, leaving the plastic disk lodged in place. There was no problem immediately after intubation as the distal opening was clear. Gradually the distal end of the ETT would have been partially occluded by secretions, leading to a partially obstructed airway. It explains the high P_{peak}, upsloping $EtCO_2$ trace, and hypoxia. There was no alternative pathway for airflow as Murphy's eye had remained sealed – our safety net feature had led to a dangerous intraoperative situation.

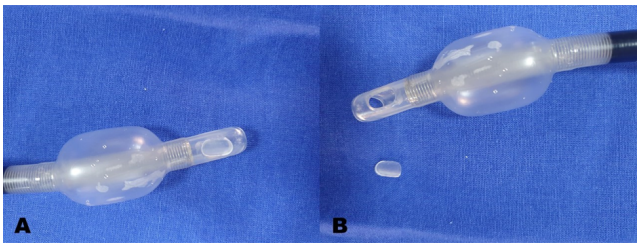

Fig. 1: Patient's end of the reinforced cuffed endotracheal tube with Murphy's eye **A:**. intact plastic disk; **B:** After removal of the plastic disk

The pre-intubation tube checking involves inflating the cuff for any leak. The integrity of the cuff is checked with just the pilot balloon being accessed while the ETT remains in its packaging to retain sterility. In our case, the reinforced ETT had a retained plastic disk covering Murphy's eye cut out that should have been removed during manufacturing. The sealed murphy's eye was very easily missed as the plastic disk was clear and could not be discerned with the tube still inside the packaging. Hence, it should also routinely be checked that this plastic disk is removed from Murphy's eye and is not localized on or inside the tube. In the literature, preoperative, intraoperative and postoperative discovery of loosely adherent plastic slug or detached Murphy's eye remnant have been reported.[1–3] In our patient, the retained plastic disk within Murphy's eye had led to an intraoperative partial tube obstruction in an obese patient in the prone position – an airway nightmare for anesthesiologists. Although, the complication had been managed without any harm to the patient, this could have quickly become a catastrophe had the disk been dislodged into the lungs or had caused a complete ventilatory failure leading to cardiac arrest.

To conclude, the safety of the anesthetized patient lies, ultimately, in the hands of the anesthesiologist. This manufacturing defect led to a crisis in the operating theater and not in the area of production. Despite all our fail-safe measures, we must always be wary of the fact that there might still be something dangerous that has bypassed our numerous safety checklists.

Conflict of Interest

None.

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