A rare incident of accidentally cut inflation tube in a critically ill intubated patient: Quick and simple approach that proved lifesaving

Sir,

In an intubated patient, large air leak from endotracheal tube (ETT) may cause difficult ventilation and aspiration of oropharyngeal secretions. Though the underlying defect usually lies in the cuff, the problem may be anywhere proximal to it. Defects in cuff inflation tube, pilot balloon, one-way inflation valve may rarely cause air leak but unlike cuff damage, these conditions do not necessarily require changing of ETT. Changing ETT in patients with severe hypoxemia, upper airway surgery, airway injury or oedema, difficult airway, full stomach, acute respiratory distress syndrome requiring high positive end expiratory pressure (PEEP) or patient in prone position may be hazardous. We herein describe the management of inadvertent cutting of inflation line during shaving, a rare circumstance, in a critically ill patient who had a difficult airway.

A 62-year-old man with type II diabetes mellitus, hypertension and coronary artery disease was admitted in our intensive care unit (ICU) with sepsis following gangrene of right lower limb below the knee. Patient was having acute respiratory distress syndrome (ARDS) with PaO₂/FiO₂ ratio of 118 and acute kidney injury requiring dialysis. He was on high dose noradrenaline and vasopressin support. Patient was intubated using gum-elastic bougie under C-MAC guidance due to anticipated difficult airway. On request of the patient's attendant, he was planned for shaving the beard but the cuff inflation tube was accidentally severed while shaving. This was followed by massive air leak, loss of PEEP, and sudden deterioration of oxygenation. Saturation was found to be 80% which was dropping rapidly along with a simultaneous decrease in heart rate. Any attempt to re-intubate even by rail road technique using airway exchange catheter would take time and could lead to rapid decrease in oxygenation. A 22G intravenous cannula which was available by the patient's side was introduced through the cut end of inflation tube, stylet removed, and the cuff was inflated using a syringe [Figure 1]. Ventilation improved immediately with no visible leak and saturation reached above 88% within few minutes. The ETT was subsequently replaced using airway exchange catheter following stabilisation.

Such unexpected and rare incidents of severing of cuff inflation tube may also occur while re-positioning ETT or while cutting extra length of tube tie following ETT fixation which may be fatal if not timely intervened. For fixing defects proximal to cuff involving inflation tube, pilot balloon or one-way inflation valve, different techniques using epidural connector, intravenous cannula with stopcock, and hypodermic needle have been described in literature. Management of intraoperative cuff leak without changing ETT has been reported.[1] However, intraoperative cuff leak may at times be safely managed by changing ETT in patients who are not critically ill and without co-morbidities.[2] A rare cause of repeated cuff rupture in a case requiring nasal intubation due to restricted mouth opening was a nasal spur which was managed by submental intubation.[3]

Dayan et al. conducted an in-vitro study to find out the effectiveness of 22G intravenous cannula used through cut end of inflation tube to inflate the cuff.[4] They compared effectiveness in terms of mean cuff pressure drop between repaired and unrepaired ETT over 8 hours interval and found that though the drop in mean cuff pressure was only 0.5 cm H₂O higher in repaired ETT group, tensile strength was reduced. Lauria et al. shared their experience of using 22G intravenous blunt needle/catheter for ruptured pilot balloon or line. They also suggested the use of clave connector and intravenous extension tubing for a faulty pilot balloon.[5] Similarly, Dhanda et al. described use of intravenous
cannula and three way stopcock for defective pilot balloon of a tracheostomy tube intraoperatively.[6] Rao et al. described a novel technique of preventing cuff deflation by inserting the cut end of cuff inflation tube into portex epidural connector and the cuff inflation maintained by locking the connector.[3] By using a three-way stopcock, cuff pressure can also be monitored. Though a useful technique in anaesthesia, an epidural catheter is not readily available in an ICU set-up. Keeping commercially available pilot tube repair kit, BE409 (Instrumentation industries Inc.) may be useful in such rare scenarios. In our case, we have successfully used an intravenous cannula which was readily available.

Defect of pilot balloon or cuff inflation tube may be encountered intraoperatively, outside operation theatre, during transportation, in critical care unit or in the emergency department which at times may be life threatening in some patients. Epidural connector, intravenous cannula with stopcock, or intravenous needle may be used successfully as a temporary measure when immediate exchange of endotracheal tube may not be feasible or seems life threatening.

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.

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