



High intraoperative endotracheal tube cuff pressure incidence and clinical impact

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To the Editor,

Endotracheal intubation constitutes a routine function of anesthetic practice in the operating room, sealing the airway to prevent leaks and aspiration of pharyngeal contents into the trachea. However, the rate of laryngotracheal injury following intubation has been suggested to be 11%.¹ It is theorized that the vast majority of post-intubation sequelae are related to persistently elevated cuff pressures.²

Although considerable attention is paid to the state of cuff pressure management for intubated patients admitted to intensive care units,³ almost no attention is given to the status of intraoperative cuff pressure management. To evaluate the potential for quality improvement, we aimed to identify the overall incidence of high intraoperative cuff pressure within a high-volume surgical academic center. Our University Office of the Human Protection Program policy regarding quality assurance indicated that Institutional Review Board approval was not required.

To measure the cuff pressure, we utilized an NS 60-PBS 60 cmH₂O Vacuum/Pressure Gauge (Instrumentation Industries, Inc., Bethel Park, PA, USA) connected via a three-way stopcock to the endotracheal tube pilot balloon. Specifically, the steps followed for cuff pressure measurements were:

1. Wash hands and put on gloves.
2. Ensure the stopcock “off” sign is in the direction of the valve that will attach to the pilot balloon circuit.
3. With a gloved finger, cover the remaining open valve.
4. Push the syringe inward until the pressure on the manometer reads approximately 25 cmH₂O.
5. Attach the stopcock valve to the pilot balloon.
6. Turn the “off” sign 90° to face the valve occluded by the gloved finger.
7. After momentary pressure adjustment, read and record the pressure level from the gauge face.
8. Immediately turn the “off” sign 90° back in the direction of the pilot balloon.
9. Detach the stopcock.

Random sampling of active surgical cases defined the study group. Exclusion criteria included age less than 16 yr and intraoperative use of nitrous oxide. Between 1 August and 15 October 2016, intraoperative cuff pressures of 156 patients were measured.

Median [interquartile range] cuff pressures of 35 [24–46] cmH₂O were noted, a result above the acceptable range of 20–30 cmH₂O reported in guidelines.⁴ Only 52 of the 156 (33%) patients had cuff pressures between 20–30 cmH₂O (Figure). Cuff pressures greater than 30 cmH₂O were noted in 86 of 156 (55%) patients from every surgical service, while only 18 (12%) patients had a cuff pressure less than 20 cmH₂O. Postoperative dysphagia was noted in 15 (10%) patients, but our study was inadequately powered to identify associations with this outcome.

A major cause of intubation-related injury is over-inflation and increased cuff pressure.^{1,2} Our quality improvement study clearly demonstrated a considerable incidence of high intraoperative cuff pressures throughout all surgical specialties. The fairly marked non-compliance

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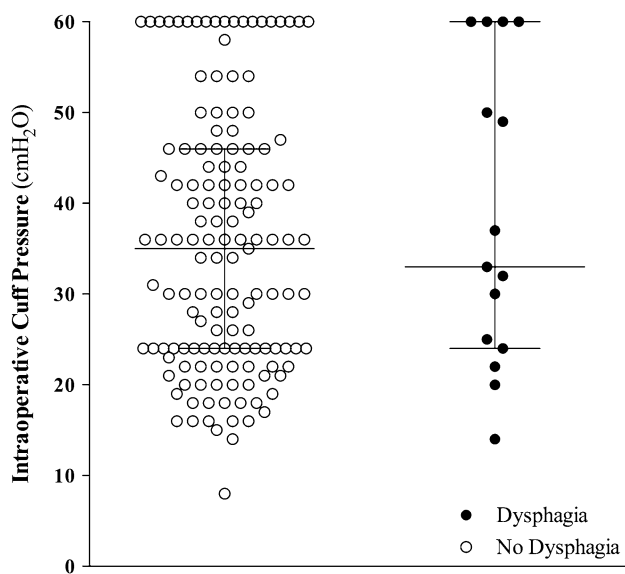


Figure Dot plot of all patients' endotracheal cuff pressures stratified by dysphagia diagnosis. The median [interquartile range (IQR)] cuff pressure of all patients was 34 [24-46] cmH₂O, with a median [IQR] in the 141 patients with no postoperative dysphagia of 35 [24-46] cmH₂O and a median [IQR] in the 15 patients with postoperative dysphagia of 33 [24-60] cmH₂O

with standards common in critical care is an issue amenable to quality improvement.

Assessing cuff pressures is a low-cost and low risk-effort that requires approximately 30 sec to perform. Training and practice of the measurement technique require approximately 15-20 min. A theoretical risk of cuff deflation during measurement was quickly seen as a non-issue in our study with repeat measurements

demonstrating no change in cuff pressure. Our data have influenced members of our institution's cardiothoracic, liver, and neurosurgical services who have begun regularly monitoring intraoperative cuff pressures. A large trial with long-term follow-up is required to define the potential benefits of cuff pressure management but is not required for anesthesiologists to adopt practices that are standard of care for our colleagues in critical care.

Conflicts of interest None declared.

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