

Cuff Pressure Monitoring

A Selected Annotated Clinical Bibliography

The prevalence of cuff hyperinflation

Prospective audit to determine endotracheal tube and laryngeal mask airway cuff pressures during general anaesthesia (abstr. 87).

Source: *Anaesthesia*. 2012;67(Suppl. s2):67.

Authors: Sandhu G, Thanawala V, Flack J.

This prospective audit was undertaken to determine endotracheal tube and laryngeal mask airway cuff pressures during general anesthesia. Data were collected over a one-month period from 61 patients undergoing surgery under general anesthesia where the airway was maintained using a single-lumen endotracheal tube or a laryngeal mask. Cuff pressures were measured using a hand-held manometer within 30 minutes of the airway device being inserted. An endotracheal tube was used in 27 (44%) cases and a laryngeal mask in 34 (56%) cases. Approximately 52% of the endotracheal tube and 97% of the laryngeal mask cuff pressures measured in this cohort were greater than the recommended cuff pressures of 25 cm H₂O and 60 cm H₂O, respectively.

The authors concluded that the situation would likely improve “by making manometers available in every area where general anesthesia is undertaken and cuffed devices used to maintain a patent airway”.

Tracheal tube and laryngeal mask cuff pressure during anaesthesia - mandatory monitoring is in need.

Source: *BMC Anesthesiol*. 2010;10:20.

Authors: Rokamp KZ, Secher NH, Moller AM, Nielsen HB.

This prospective quality control study sought to compare the cuff pressures of a single-use laryngeal mask and a cuffed endotracheal tube in 201 patients undergoing elective surgery that necessitated general anesthesia but did not involve the use of nitrous oxide. Following insertion of the devices, the cuff was inflated without the use of a manometer or a pressure release valve. In the 119 patients whose airways were managed with an endotracheal tube, median cuff pressure was 30 (range 8 - 100) cm H₂O and the pressure exceeded 30 cm H₂O (upper recommended level) in 54 (45%) patients. In the 82 patients whose airways were managed with a laryngeal mask, the median cuff pressure was 95 (10 - 121) cm H₂O and above 60 cm H₂O (upper recommended level) for 56 (68%) patients and in 34 of these patients, the pressure exceeded the upper cuff gauge limit (120 cm H₂O). Overweight patients were not more likely than other patients to have a higher cuff pressure, regardless of the airway device used.

According to the authors, cuff pressure exceeded the recommended level for almost 3/4 of patients provided with a laryngeal mask and for approximately 1/2 of patients provided with an endotracheal tube.

The prevalence of cuff hyperinflation (continued)

Cuff filling volumes and pressures in pediatric laryngeal mask airways.

Source: *Paediatr Anaesth.* 2006;16(1):25-30.

Authors: Maino P, Dullenkopf A, Keller C, Bernet-Buettiker V, Weiss M.

This study sought to determine how pediatric anesthesiologists manage cuff inflation and pressure with various laryngeal masks using a questionnaire. In addition, an in vitro experiment was set up to investigate the cuff pressure of various laryngeal masks (single-use and reusable) following inflation to the maximum recommended volume of air. Overall, 30 consultant anesthesiologists completed the questionnaire: 12 anesthesiologists noted that following insertion of the airway device they inflated the cuff to the maximum recommended volume and 21 anesthesiologists did not use cuff pressure monitoring on a regular basis or at all. In the in vitro study, when starting from a completely deflated cuff, inflation with the maximum recommended volume of air resulted in a cuff pressure >60 cm H₂O for almost all of the devices assessed. When starting from a resting cuff (i.e. at atmospheric pressure with the pilot balloon opened to ambient pressure), inflation with the maximum recommended volume of air resulted in a cuff pressure >120 cm H₂O for all but one of the devices assessed.

The authors concluded that “since the safe volume of air depends on several factors and varies between patients, the cuffs should be inflated with the minimum volume of air required to form an effective seal ... and the cuff pressure should be controlled”.

The association between cuff hyperinflation and airway morbidity

Use of manometry for laryngeal mask airway reduces postoperative pharyngolaryngeal adverse events: a prospective, randomized trial¹

Source: *Anesthesiology.* 2010;112(3):652-657.

Authors: Seet E, Yousaf F, Gupta S, Subramanyam R, Wong DT, Chung F.

This prospective, randomized study compared the rate of pharyngolaryngeal complications in patients who received airway management with the LMA® Classic™ Airway with and without manometry to limit intracuff pressure. Patients were aged 18–80 years with an American Society of Anesthesiologists (ASA) physical status 1–3. Of the 203 patients recruited, 200 were included in the analyses (pressure-limiting group, n=97; routine care group, n=103). The device was inserted according to the anesthesiologist’s preferred technique and the manufacturer’s instructions and then inflated to achieve an audible seal. Once spontaneous breathing was established, intracuff pressure was measured using a hand held manometer. In the pressure-limiting group, intracuff pressure was reduced to between 54 and 60 cm H₂O if it was found to exceed 60 cm H₂O; in the routine care group, intracuff pressure was left unchanged. The rate of post-operative pharyngolaryngeal adverse events was significantly lower in the pressure-limiting group than in the routine care group (13% vs. 46%; p<0.001). Use of a manometer to reduce cuff pressure in the pressure-limiting group reduced pharyngolaryngeal complications by 70%.

The authors strongly recommended that “the routine use of manometry after [laryngeal mask] insertions be established as a best practice” and that cuff pressures be deflated to less than 60 cm H₂O.

Cuff pressure monitoring

Clinical evaluation of a novel LMA with a color-coded pressure gauge

Source: *Int J Pediatr Otorhinolaryngol.* 2013;77(1):76-78.

Authors: Martin DP, Bhalla T, Thung A, Tobias JD.

This prospective, single-center study evaluated the accuracy of a cuff pressure indicator built in to the inflation valve of the AES Ultra CPV™ airway device in pediatric patients undergoing general anesthesia. Seventy-one boys and 29 girls aged 3 months to 18 years were included in the study. One patient was subsequently excluded. The device was inserted with the cuff partially inflated, with further inflation as needed to ensure a seal during positive pressure ventilation to a peak inflating pressure of 20-25 cm H₂O. Intracuff pressure (as measured by a manometer) was >60 cm H₂O in 31 of 99 (31%) patients, despite air only being added to the cuff in 7 of these cases. The CPV worked correctly in 95% of the uses (94/99) and in 4/5 remaining LMA's the difference was less ≤4 cm H₂O. In 4/5 instances, the reading on the manometer deviated from the reading on the color-coded pressure gauge by ≤4 cm H₂O.

The authors concluded that use of an airway device with an in-built, color-coded cuff pressure indicator allowed for the accurate measurement of intracuff pressures in pediatric patients.

New supraglottic airway with built-in pressure indicator decreases postoperative pharyngolaryngeal symptoms: a randomized controlled trial.

Source: *Can J Anaesth.* 2013;60(12):1197-1203.

Authors: Wong DT, Tam AD, Mehta V, Raveendran R, Riad W, Chung FF.

This randomized controlled trial sought to identify whether the use of a laryngeal mask with a built in cuff pressure indicator would reduce post-operative pharyngolaryngeal morbidity symptoms compared with a standard laryngeal mask without cuff pressure guidance. One hundred and seventy patients undergoing surgical procedures requiring general anesthesia were enrolled in the study. Eighty-five patients received the standard laryngeal mask and 85 patients received the laryngeal mask with cuff pressure indicator. The standard laryngeal mask was completely deflated prior to insertion; once inserted, the anesthesiologist was permitted to palpate the pilot balloon and inflate the cuff at his or her discretion. The insertion technique used for the laryngeal mask with cuff pressure indicator was identical except that the cuff was inflated until the cuff pressure indicator was within the green zone (30–44 mmHg). Mean (SD) intracuff pressure was significantly lower in the cuff pressure indicator group compared with the standard laryngeal mask group at five minutes [44 (4) mmHg vs 87 (37) mmHg, respectively; (P<0.001)] and at 20 min post-insertion [44 (4) mmHg vs 86 (36) mmHg, respectively; (p<0.001)]. There was no difference in the intracuff pressure between five minutes and 20 minutes post-insertion in either group. The incidence of post-operative pharyngolaryngeal morbidity symptoms was significantly lower in the cuff pressure indicator group than in the standard laryngeal mask group (26% vs 49%, respectively; p=0.002). This equated to an absolute risk reduction of 24% and a relative risk reduction of 48%.

The authors concluded that using an in-built cuff pressure indicator can limit intracuff pressure to 44 mmHg (60 cmH₂O) and reduce postoperative pharyngolaryngeal symptoms by 48% compared with a standard laryngeal mask.



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