TABLE Volume of air/normal saline (NS) injected and aspirated from the pilot balloon.

Group	*Volume injected in mL (mean ± SD)*	*Volume aspirated in mL (mean ± SD)*
1-Air in protruding ET cuff	10 ± 0	10.2 ± 0.6
2-Air in punctured ET cuff	10 ± 0	13.7 ± 2.0*
3-NS in protruding ET cuff	10 ± 0	9.8 ± 0.2
4-NS in punctured ET cuff	10 ± 0	3.5 ± 0.9*

*Significant difference from the volume injected P < 0.05.

tions. Forty intubations were performed in mannequins with 8 mm high-volume low-pressure cuffed ET, divided into four groups of ten. The ET cuffs were inflated with 10 mL of air in Groups I and II; and with 10 mL of normal saline (NS) in Groups III and IV. In Groups I and III, ET cuffs were intact and allowed to protrude partly above the vocal cords. In Groups II and IV, ET cuffs were punctured with a 22 gauge needle and placed properly in the trachea.

The feel of the pilot balloon was graded by an anesthesia technician blinded to group allocation and found to be similar in all groups. Air or NS was then aspirated from the ET cuffs. The volumes injected and the volumes retrieved were compared by Student's t test (Table).

In intact ET cuffs protruding partially above the vocal cords, there was no significant difference between the volume of air injected and the volume of air aspirated from the cuffs (Group I). There was a significant increase in the volume of air aspirated compared to the volume injected in punctured ET cuffs placed properly inside the trachea (Group II).

In intact ET cuffs protruding partially above the vocal cords, there was no significant difference between the volume of NS injected and the volume of NS aspirated (Group III). There was a significant decrease in the volume of NS aspirated compared to the volume injected in punctured ET cuffs placed properly inside the trachea (Group IV).

Therefore, we suggest that the volume of aspirate from the ET cuff provides important clues regarding ET displacement or cuff injury. When the volume of aspirate is similar to the one injected, this indicates that there is no injury to the ET cuff and partial dislodgement is a likely explanation. When the volume of aspirate differs from what was injected into the ET cuff, injury to the ET cuff is probable. Further, when NS is used, volume is lost through the injured ET cuff, hence the volume of aspirate is less then what was injected. However, when air is used to inflate the ET cuff, gas may be aspirated from the injured cuff, increasing the volume retrieved. We recommend that this test be performed to differentiate tube misplacement from ET cuff injury in the presence of an air leak in the intubated patient.

Atul Gaur MD
Anil Agarwal MD
Garima Garg MD
Lucknow, India

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Gum elastic bougie-guided placement of the ProSeal™ laryngeal mask

To the Editor:

We report the use of a gum elastic bougie (GEB) to facilitate placement of the ProSeal™ laryngeal mask airway (PLMA).

After inducing anesthesia in a 45-yr-old male for elective orthopedic surgery, a size 5 PLMA was inserted using the digital technique with a midline approach; however, insertion failed because the tip collided with the glottic inlet, as evidenced by complete airway obstruction, air leakage up the drainage tube and excess protrusion of the bite block from the mouth. A second attempt using the digital technique with a lateral approach also resulted in glottic impaction. For the third attempt, a 16 FG well-lubricated GEB (Eschmann tracheal tube introducer, SIMS Portex Limited, UK) was threaded down the drainage tube with the curved end proximally (Figure). Under laryngoscope-guidance, the distal end the GEB was

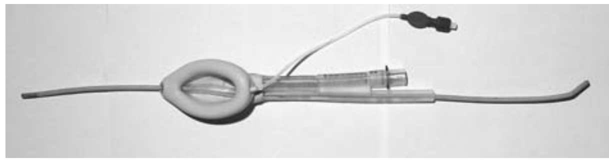

FIGURE Proseal™ laryngeal mask airway with gum elastic bougie protruding from both ends of the drainage tube.

fed into the esophagus. The laryngoscope was then removed and the PLMA railroaded into position using the digital technique with a midline approach. On this occasion, ventilation was easy with no air leakage and the bite block was correctly located between the teeth. The GEB was removed whilst holding the PLMA. Subsequent passage of a gastric tube was easy.

By guiding the PLMA tip towards the hypopharynx the GEB ensures that the PLMA is correctly positioned. The GEB may also help prevent impaction in the back of the mouth and should prevent the cuff folding over. Drolet and Girard[1] recently described a similar technique using a gastric tube. We speculate that the GEB is a better guide than the gastric tube because of its greater stiffness.

A. Howath MB BS
J. Brimacombe MB CHB FRCA MD
Cairns, Australia
C. Keller MD
Innsbruck, Austria
S. Kihara MD
Ibaraki, Japan

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Systemic effects of subcutaneous and topical epinephrine administration during burn surgery

To the Editor:
Subcutaneous injection (tumescence) of burn wounds and skin graft donor sites with epinephrine-saline solution (1:500 000, 2 $\mu g \cdot mL^{-1}$) in conjunction with topical epinephrine dressings (1:33 33, 30 $\mu g \cdot mL^{-1}$) reduces blood loss during tangential burn wound excision.[1] Despite the demonstration of elevated levels in the blood, the cardiovascular effects of administered epinephrine during anesthesia have not been quantitatively described in the anesthesia literature.[2,3] In this pilot study, we performed a semi-quantitative analysis of the incidence and severity of intraoperative cardiovascular adverse events to generate hypotheses and to guide a prospective study of anesthesia for this operation.

A retrospective cohort analysis of all anesthetic and surgical records of 52 consecutive patients (80 operations) admitted to the Ross Tilley Burn Centre between December 30, 1998 and June 30, 1999 was performed. Systolic blood pressure (SBP), heart rate (HR), and electrocardiogram data were collected in the 15 min (baseline) period prior to epinephrine injection and for five-minute intervals over a period of 60 min postepinephrine administration.

The mean age of the study cohort was 46 yr (95% CI, 42–49), and the mean % total body surface area burn was 19% (95% CI, 16–22). The majority of the patients were male (69%). The most frequent (mode) ASA physical status classification was II. In the 80 operations the mean dose of subcutaneous epinephrine injected was 5.6 mg (95% CI, 3.3–6.8). In 62 of 80 cases there was an increase in SBP of less than 15% from the pre-injection baseline. In 18 of 80 cases an increase in SBP of greater than 15% occurred (mean 45.3%, 95% CI, 35.0–55.6). Correlation between epinephrine dose, whether subcutaneous (Pearson correlation coefficient $r^2 = 0.003$) or topical ($r^2 = 0.010$) and % change in SBP was poor (Figure). In 6/18 cases with an increase in SBP of greater than 15% there was also a mean increase in HR of 11 $beats \cdot min^{-1}$ (95% CI, 3–20). Transient ST segment depression occurred in 1/18 patients. There were no intraoperative dysrhythmias.

To summarize our findings, administration of subcutaneous and topical epinephrine during burn surgery was associated with a low incidence of intraoperative cardiovascular sequelae. There was a poor correlation between dose of epinephrine and intraoperative changes in blood pressure. Our results may reflect desensitized beta-receptor responses following burn injury, which have been demonstrated in rats[4] and in human *ex vivo* lymphocytes.[2] Alternatively, they may reflect varying depths of anesthesia in the study cohort. A prospective study will investigate the interaction between depth of anesthesia and cardiovascular responses during burn surgery.

Stephen A. Ford MD
Andrew B. Cooper MD
Jenny Lam-McCulloch MSc
Manuel Gomez md MSc
Robert C. Cartotto MD
Toronto, Ontario

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