

## Correspondence

### *Epidural combined with propofol anesthesia does not suppress the hyperglycemic response to abdominal surgery*

To the Editor:

In light of the results of most recent studies showing better survival of surgical patients with tight glycemic control the preservation of intraoperative normoglycemia gains clinical relevance.<sup>1</sup> Epidural anesthesia in the absence of general anesthesia has long been recognized to suppress the hyperglycemic and endocrine responses to pelvic surgery.<sup>2</sup> The failure of epidural anesthesia combined with inhalation anesthesia to maintain glucose homeostasis during major abdominal surgery was traditionally ascribed to incomplete inhibition of the counterregulatory endocrine response.<sup>3</sup> Studies demonstrating that inhaled agents per se, in contrast to *iv* anesthetics such as propofol,<sup>4</sup> provoke hyperglycemia, however, indicate that the use of inhaled anesthesia may be, at least in part, responsible.<sup>5</sup> We thus speculated that combining epidural anesthesia with *iv* propofol anesthesia would prevent the hyperglycemic response to colorectal surgery.

After obtaining patient consent we studied six consecutive ASA II patients (three male, three female, mean age  $69 \pm 12$  yr) who underwent resection of colorectal cancer (three hemicolectomies, three sigmoid resections) by the same surgeon (S.M.). An epidural catheter was inserted immediately before the operation between T10 and T12. Afferent neural blockade was established with bupivacaine 0.5% to achieve a bilateral sensory block from T4 to L2, and epidural anesthesia was maintained during the operation by boluses of bupivacaine 0.25%. General anesthesia was induced with propofol administered at a dose to abolish the eye reflex. Tracheal intubation was facilitated by rocuronium  $0.6 \text{ mg}\cdot\text{kg}^{-1}$  *iv* and the lungs were ventilated to normocapnia with oxygen-enriched air. General anesthesia was maintained by continuous infusion of propofol at  $6$  to  $10 \text{ mg}\cdot\text{kg}^{-1}\cdot\text{hr}^{-1}$ . Normal saline 0.9% was infused at a rate of  $6 \text{ mL}\cdot\text{kg}^{-1}\cdot\text{hr}^{-1}$ . Blood losses were replaced by normal saline in a ratio of 3:1. Phenylephrine boluses ( $100 \mu\text{g}$  *iv*) were given to maintain a mean arterial pressure above 60 mmHg. Arterial blood glucose concentrations were measured before anesthesia, 80 min and 120 min after surgical skin incision using the Accu-Chek<sup>TM</sup> glucose monitor (Roche Diagnostics, Basel, Switzerland).

Differences in blood glucose concentrations were determined using analysis of variance for repeated measures.

The blood glucose concentration increased from  $5.5 \pm 0.6 \text{ mmol}\cdot\text{L}^{-1}$  prior to surgery to  $6.7 \pm 1.2 \text{ mmol}\cdot\text{L}^{-1}$  at 80 min ( $P < 0.05$ ) and  $7.1 \pm 1.3 \text{ mmol}\cdot\text{L}^{-1}$  at 120 min of surgery ( $P < 0.05$ ). The intraoperative values were numerically greater than values previously obtained in patients undergoing colorectal surgery under combined epidural and inhalation anesthesia.<sup>3</sup>

Our data suggest that a clinically modest hyperglycemic response to colorectal surgery occurs in patients receiving epidural anesthesia during propofol anesthesia.

Thomas Schrickler MD PhD

George Carvalho MD

Sarkis Meterissian MD MSc

Royal Victoria Hospital, McGill University,  
Montreal, Canada

E-mail: thomas.schricker@mcgill.ca

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### *Another method to assist nasogastric tube insertion*

To the Editor:

Insertion of a gastric tube can be a difficult and frustrating experience, especially in patients who are anes-

thetized, paralyzed and sedated.<sup>1,2</sup> Ozer and Benumof have found that the most common sites of impaction of orogastric and nasogastric tubes are pyriform sinuses and arytenoids cartilages, rendering its coiling in the oropharynx.<sup>3</sup> In our experience, in addition to the impaction of tube against these structures, the basic design of the tube contributes to tube coiling in the oropharynx. The distal 6 cm of the gastric tube has multiple holes that are weak points. Once the tube is impacted against the pyriform sinuses or arytenoid cartilage, bending of the tube occurs at these weak points, thereby promoting coiling and retarding its entry into the esophagus.

We explain a technique of digital assistance to facilitate the insertion of gastric tube (orogastric or nasogastric) in anesthetized and sedated patient. The gloved index finger of the left hand is introduced into the left side of the oral cavity of the patient. Once the gastric tube is negotiated into the oropharynx, it is pulled towards the lateral pharyngeal wall with the index finger, virtually grasping it between the index finger and the lateral pharyngeal wall. As the tube is pushed to the proximal end by the right hand, the left index finger simultaneously guides the tube along the lateral pharyngeal wall into the esophagus. The fingertip provides the buttress against the holes in the distal part of the gastric tube providing it the requisite sturdiness, preventing its bending and impaction with simultaneous steering into the esophagus.

Our method is akin to that reported by Bong and colleagues, which tends to keep the gastric tube adjacent to the lateral pharyngeal wall.<sup>1</sup> Our technique avoids some of the time consuming and technically demanding measures of failed gastric tube insertion. No lateral bending of the head, lateral neck pressure or anterior lifting of the thyroid cartilage is required.<sup>1,3,4</sup> These maneuvers may not be possible in patients with cervical spine trauma, cervical traction or in neck surgery, where our method can be used easily. Further, digital palpation of the feeding tube in the oral cavity almost obviates the need to check the entry of the gastric tube into the esophagus or its retention in the oropharynx, if any, by direct laryngoscopic examination. This technique has been used by us approximately 90 times over the past six months and was found to be successful approximately 83% of times it was used.

Rajesh Mahajan MD  
Rahul Gupta MD  
ASCOMS, Jammu and Kashmir, India  
E-mail: drmahajan@yahoo.com

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## *Re-expansion pulmonary edema following laparotomy for volvulus*

To the Editor:

Re-expansion pulmonary edema (REPO) is an uncommon life-threatening condition that results mostly from rapid drainage of long-standing pleural effusion or pneumothorax. We report yet another unusual cause of REPO in a surgical patient with acute abdomen.

A 24-yr-old autistic girl presented to the general surgeons with a two-day history of abdominal pain and distension. She deteriorated prior to surgery and was admitted as an emergency on the intensive care unit in extremis with severe hypoxemia and a tense grossly distended abdomen. Despite pre-oxygenation the SpO<sub>2</sub> did not rise above 85%. Tracheal intubation was successfully performed but lung compliance was extremely poor. Despite use of high inflation pressures with positive end-expiratory pressure, the SpO<sub>2</sub> deteriorated down to 60% on FiO<sub>2</sub> of 1.0. With the situation becoming desperate, a decompressive laparotomy was performed in the intensive care unit. Immediately the lung compliance improved *pari passu* with the SpO<sub>2</sub>, which rose to 96%. However she developed pulmonary edema a few minutes later. She was immediately transferred to the theatre for a formal extended right hemicolectomy for a massive dilatation of transverse colon secondary to a volvulus.

She was electively ventilated postoperatively in the intensive care unit. Postoperative chest *x-ray* showed bilateral pulmonary shadowing. Gas exchange improved over the next 24 hr to allow ventilatory weaning and extubation.

Reported REPO from unusual causes include delayed repair of traumatic diaphragmatic hernia<sup>1</sup> and excision of extra-pleural lesions such as mediastinal tumours and giant hepatic cysts.<sup>2,3</sup> Clinical presenta-

tion ranges from asymptomatic chest radiological abnormalities to severe cardiorespiratory insufficiency and death. It is commonly ipsilateral (92.3%) and bilaterality worsens the prognosis. In about two thirds of reported cases REPO develops rapidly within an hour and typically occurs following lung collapse of three days duration or more.<sup>4</sup>

The pathophysiology is not completely understood. Mechanical and biological factors are probably involved in the pathogenesis of REPO as a consequence of ischemia of collapsed segments and their reperfusion. Using a rabbit model Sakao *et al.* have demonstrated an inflammatory process in segmental collapse and reperfusion.<sup>5</sup> Mechanically, lung re-expansion generates a negative perivascular pressure with a parallel rise in hydrostatic pressure due to vascular flooding with possible capillary damage.

We postulate in this patient that marked abdominal distension which gradually worsened over three days, resulted in significant bilateral lung collapse. On decompressing the abdomen the lungs expanded rapidly, akin to rapid drainage of a large pleural effusion, with consequential REPO.

Moses Chikungwa FRCA  
 Rebecca Micklewright FRCA  
 Simon Hester FRCA  
 The Royal Wolverhampton Hospitals,  
 Wolverhampton, UK  
 E-mail: mchikungwa@yahoo.co.uk

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## *Pre-existing otitis media and hearing impairment after interscalene block combined with general anesthesia*

To the Editor:

A 30-yr-old man presented with a traumatic injury of his clavicle. An upper respiratory tract infection was noted during the preanesthetic interview. Anesthesia was provided with a right interscalene plexus block, using a 22-G needle and nerve stimulation. A muscular response of the deltoid and biceps was easily obtained at 0.7 mA, and 30 mL of ropivacaine 0.75% were injected after negative aspiration. Horner's syndrome was not recorded and no complication occurred. Shoulder surgery was started after induction of general anesthesia using nitrous oxide in oxygen, propofol, sufentanil, and placement of a laryngeal mask airway. Upon emergence, the patient complained of a profound hearing loss of the ear ipsilateral to the block. This hearing loss was not associated with fullness in the ear, tinnitus, vertigo or headache. Immediate ear examination performed by an otorhinolaryngologist confirmed a bilateral serous otitis media with effusion and retracted tympanic membranes. Audiometric testing performed on the same day disclosed a conductive deficit (homogeneous decrease of 30 dB in all frequencies for air conduction with normal and symmetric bone conduction) and was normal for the opposite ear. Motor block lasted six hours, while hearing loss notably improved within a few hours after recovery of motor function and completely disappeared within four days. An audiogram repeated one month later showed complete recovery.

General anesthesia using nitrous oxide may have impacted on the movement of the tympanic membrane and thus the stapes.<sup>1</sup> However, we believe that regional anesthesia was the triggering factor, as hearing loss was experienced only ipsilateral to the block while otitis media was detected bilaterally. One would have expected nitrous oxide to alter hearing bilaterally. Moreover, hearing recovered with the same time profile as the interscalene block. Rosenberg has described a case of hearing impairment after interscalene brachial plexus block anesthesia.<sup>2</sup> Sympathetic block-induced vasodilatation induced edema of the mucosal membranes of the Eustachian tube (ET) and the middle ear, thereby producing a hearing decrement on that side.

Otitis media also contributed to hearing impairment by obstructing the ET and by causing tympanic cavity mucosal edema.<sup>3,4</sup> In this patient with otitis media, vasodilatation of the ET and the tympanic cav-

ity associated with an interscalene block led to complete obstruction of an already partially obstructed ET, thus creating acute transient hearing loss.

Viviane Chalhoub MD

Leila Arnaout MD

Jean Prin-Derre MD

Richard Mavris-Imbert MD

Dan Benhamou MD

Hôpital de Bicêtre, Le Kremlin-Bicêtre, France

E-mail: dan.benhamou@bct.ap-hop-paris.fr

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### *Thyroid cyst puncture during cannulation of the internal jugular vein*

To the Editor:

Central venous cannulation is an important aspect of anesthesia practice. It allows monitoring of central venous pressure and provides intraoperative vascular access for administering fluids, blood products and drugs. It is also used for insertion of pulmonary artery catheters, transvenous electrodes, and for observation and treatment of venous air embolism. The complication rate associated with internal jugular vein (IJV) catheterization may be as high as 10%.<sup>1</sup> There are reports of arterial puncture, hematoma, pneumothorax, malposition of catheter and injuries to the thoracic duct, nerves and trachea. We describe here a case of thyroid cyst puncture during cannulation of IJV.

A 62-yr-old woman with intractable seizures was scheduled for craniotomy and resection of skull base meningiomas. Her past medical history consisted of diabetes and hypertension. General anesthesia was induced without difficulty. The right IJV was selected for cannulation using the landmark method. There

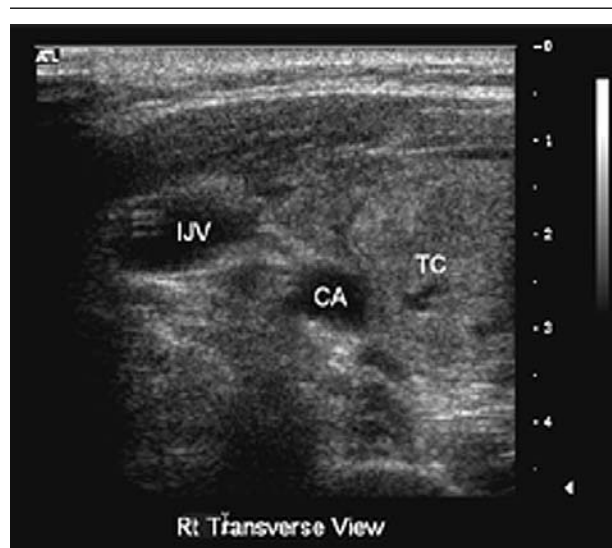


FIGURE The partially cystic thyroid nodule (TC) displaced the carotid artery (CA) posteriorly and the internal jugular vein (IJV) laterally.

were no obvious neck masses or structural abnormalities, except that the carotid pulse was not palpable.

The needle was inserted at the apex of the triangle, defined by the sternal and clavicular heads of the sternocleidomastoid muscle and the clavicle, aiming toward the ipsilateral nipple. Clear viscous fluid was aspirated during insertion (at a depth of approximately 4 cm). No air was encountered, and the needle was withdrawn. Another attempt using a more lateral insertion site encountered venous blood, and the catheter was successfully placed. The patient remained stable throughout the operation. A postoperative ultrasound revealed an enlarged thyroid gland with a partially cystic nodule measuring  $3.6 \times 3.1 \times 1.9$  cm. The thyroid nodule containing cysts overlay the right carotid artery. It displaced the carotid artery posteriorly and the IJV laterally (Figure). As a result, it was difficult to palpate the carotid pulse, and insertion of the needle according to the landmarks led to the thyroid cyst puncture.

Ultrasound guidance would have facilitated the procedure, and avoided the puncture of the thyroid cyst. The role of ultrasound for central venous line placement is currently receiving interesting attention in clinical practice and in the literature. Evidence<sup>2,3</sup> has suggested that, compared with the landmark method, ultrasound guidance improved success rate, reduced the number of needle passes and decreased complica-

tions associated with IJV cannulation. The National Institute for Clinical Excellence<sup>4</sup> recommends 2-D imaging ultrasound guidance for insertion of central venous catheters into the IJV. Based upon our experience with this case, we are in favour of pursuing this evolving technology in anesthesia practice.

Catherine Kim MD  
 Ron Crago FRCPC  
 Vincent Chan FRCPC  
 Martin Simons FRCPC  
 Toronto Western Hospital, Toronto, Canada  
 E-mail: catherine.kim@utoronto.ca

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### *Antecubital approach for monitoring jugular bulb venous oxygen saturation during carotid endarterectomy*

To the Editor:

Monitoring of jugular bulb venous oxygen saturation ( $SjO_2$ ) is one method used to detect changes in cerebral oxygen saturation during carotid endarterectomy (CEA).<sup>1,2</sup> However, it usually requires direct insertion of a catheter within the operating field to obtain either continuous or intermittent monitoring of  $SjO_2$ .<sup>1–3</sup> We have recently used a novel alternative method for insertion of the catheter which avoided disturbance of the surgical procedure.

The antecubital vein was used to cannulate the jugular bulb. We chose a 5.5 Fr fiberoptic pulmonary artery catheter (Opticath®, Abbott Laboratories, North Chicago, IL, USA). First, a 6 Fr introducer sheath was placed, and then the 5.5 Fr fiberoptic catheter was advanced through the indwelling introducer sheath. A fluoroscopic image guide was essential



FIGURE Successful placement of the fiberoptic catheter at the right jugular bulb on *x-ray* anteroposterior view, which shows the catheter tip situated cranial to a line extending from the atlanto-occipital joint space and caudal to the lower margin of the orbit.<sup>4</sup> The arrow indicates the catheter tip. The catheter line can be traced distally via the clavicle on the film.

to advance the catheter with the arm positioned alongside the body and the head rotated 20 to 30° contralaterally. Usually, several attempts were required to introduce the catheter to the internal jugular vein. Changing the head and arm positions or rotating the catheter tip are additional maneuvers for successful advancement of the catheter based upon our initial experience. The catheter tip is advanced to the appropriate site for monitoring of  $SjO_2$  with the aid of fluoroscopy. The Figure shows successful placement of the fiberoptic catheter at the right jugular bulb. We attempted this method in three patients. The first trial case failed due to our limited experience, but in the next two cases, the catheter was placed successfully.

The method we describe will require further detailed evaluation; however it presents clear advantages for monitoring SjO<sub>2</sub> during CEA. Further refinements may improve this technique, including use of a guide wire for introducing the catheter into the internal jugular vein. In addition, this method should be compared with the conventional technique of monitoring SjO<sub>2</sub> during CEA in terms of 1) accuracy and continuity of measurements, 2) time necessary to obtain the measurement and 3) cost effectiveness evaluation. Further improvement and experience are essential for establishing the effectiveness and safety of this potentially promising approach to SjO<sub>2</sub> monitoring.

Satoki Inoue MD

Masahiko Kawaguchi MD

Hitoshi Furuya MD

Toshisuke Sakaki MD

Nara Medical University, Nara, Japan

E-mail: seninoue@naramed-u.ac.jp

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## *Use of Shikani Flexible Seeing Stylet for intubation via the Intubating Laryngeal Mask Airway*

To the Editor:

The Intubating Laryngeal Mask Airway (ILMA; The Laryngeal Mask Company, LMA North America, Inc., San Diego, CA, USA) has been designed to allow easier intubation than the LMA.<sup>1</sup> A fibroscope is useful in facilitating intubation via the ILMA, but when it is not

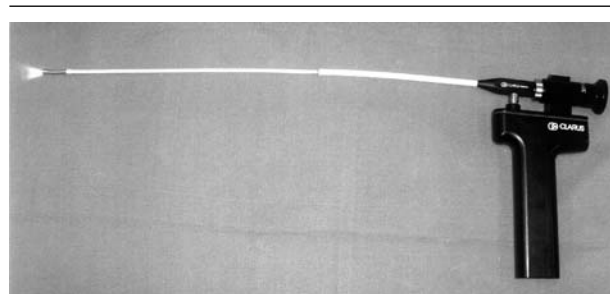


FIGURE The Shikani Flexible Seeing Stylet.

available, the "Shikani Flexible Seeing Stylet™" (Clarus Medical, Minneapolis, MN, USA; Figure) presents a useful alternative.<sup>2–4</sup> We assessed the efficacy of the ILMA and Shikani Flexible Seeing Stylet™ associated technique using an ILMA endotracheal tube, or a standard endotracheal tube.

After obtaining written patient informed consent, the study was performed using the dedicated ILMA endotracheal tube on 13 patients (Group A), or a standard endotracheal tube into the ILMA in six patients (Group B). After positioning the ILMA, the operator introduced into the airway tube of the ILMA, the dedicated endotracheal tube or a standard endotracheal tube inside the Shikani's Stylet. While elevating the mandible, the endotracheal tube was advanced under direct vision through the vocal cords.

Twelve patients in Group A were successfully intubated: ten during the first attempt and two during the second attempt with an "up-down manoeuvre". In one woman the technique failed after two attempts and she was intubated successfully by direct laryngoscopy (Cormack-Lehane 1). In Group B the technique failed in four patients during the second attempt; they too, were intubated by direct laryngoscopy. In one patient, intubation was interrupted during the first attempt (blood in the airway tube) and intubation was achieved by direct laryngoscopy. One patient in this group, was successfully intubated during the second attempt, with "up-down manoeuvres".

The technique we describe does not seem to be useful with a standard endotracheal tube. This is unfortunate, as it may have been useful in an emergency situation. Jaw elevation was used for every patient, suggesting that experience with the ILMA is necessary. Our findings suggest that the ILMA is not indicated when the patient has a low posterior larynx (easy direct laryngoscopy, Cormack-Lehane 1), but

does confer benefits when the glottis is high and anterior (difficult direct laryngoscopy).<sup>1</sup>

The major limitation of the Shikani Flexible Seeing Stylet™ is that it cannot be orientated in a precise direction, unlike the fibroscope, although it is cheaper, portable and malleable. The Seeing Stylet provides excellent illumination of the neck like a lightwand,<sup>5</sup> permitting direct visualization too. In summary, the Shikani Flexible Seeing Stylet™ may facilitate intubation via the ILMA because it offers the advantages of the fibroscope technique with the characteristics of the lighted stylet. However, it does have technical limitations, and is more useful with an ILMA endotracheal tube compared to a standard endotracheal tube.

Felice Eugenio Agrò MD

Serena Antonelli MD

Rita Cataldo MD

University School of Medicine Campus Bio Medico,  
Rome, Italy.

E-mail: f.agro@unicampus.it

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## *Using a Glidescope for intubation with a double lumen endotracheal tube*

To the Editor:

A 74-yr-old male (185 cm tall, 124 kg weight, body mass index 34 kg·m<sup>-2</sup>) was scheduled for left thoracotomy because of a left hilar mass. The patient's airway exam revealed a Mallampati class 3 airway, intercoris distance of 4.2 cm, neck flexion of 45°, neck extension less than 30°, and a hyomental distance of 3.0 cm.

A possible difficult airway was anticipated, and it was decided to use a Glidescope (Saturn Biomedical Systems, Burnaby, BC, Canada) for laryngoscopy. After preoxygenation, the patient was induced with fentanyl, propofol, and succinylcholine. The Glidescope was inserted and a Cormack-Lehane Grade 1 view of the vocal cords (VC) was seen. A 39 Fr left double lumen endotracheal tube (DLT) was inserted through the VC up to the bronchial cuff. Resistance was met and the DLT was unable to pass further. After mask ventilation, a second laryngoscopy with the Glidescope resulted in intubation of the DLT up to the tracheal cuff. The DLT position was checked with a fibreoptic bronchoscope which became wedged, and the DLT tube had to be removed. After mask ventilation, a third laryngoscopy with the Glidescope was performed, and a 37 Fr left DLT was successfully placed. Placement of the 37 Fr DLT in the left main bronchus was verified with the fibreoptic bronchoscope, and the operation proceeded uneventfully with good lung isolation.

Inserting endotracheal tubes for lung isolation can be difficult in patients with a difficult airway.<sup>1</sup> The Glidescope videolaryngoscope has been shown to be useful in patients with difficult airways.<sup>2</sup> Compared with the Bullard blade, another difficult airway device that has been used to insert DLTs,<sup>3</sup> the Glidescope may also be easier to use<sup>2</sup> and does not need a special guide.<sup>4</sup> Also, DLTs inserted with the Bullard blade may be successfully placed in the desired left main bronchus only 32% of the time.<sup>3</sup>

Several maneuvers helped in successfully placing the left DLT with the Glidescope. We suggest bending the stylet of the DLT so that the distal 16 to 20 cm of the DLT curve follows the curve of the Glidescope,<sup>5</sup> and the other end of the DLT angles out to the right side. After the bronchial cuff passes through the VC, withdraw the stylet of the DLT about 2 cm. Then, rotate the DLT 90° counterclockwise while advancing the DLT to the desired depth.

Ada A. Hernandez MD

David H. Wong pharmd MD

VA Long Beach Healthcare System, Long Beach,  
USA

E-mail: david.wong@med.va.gov

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### *Optimum contents of a portable emergency airway equipment bag: results of an institutional survey*

To the Editor:

Previous studies suggest that emergency crash carts may not always be readily available or adequately stocked.<sup>1,2</sup> In view of this, anesthesia residents and fellows in our institution carry a portable airway equipment bag to all emergencies. We carried out a department wide survey in an attempt to optimize and standardize the equipment and drugs included in this bag.

Forty-two staff, fellows and residents in anesthesia working at the Hospital for Sick Children, Toronto, were surveyed in October 2004. A preliminary questionnaire was pretested by sending it to selected departmental members. Sixty-four possible items for inclusion in a portable airway equipment bag were listed on the final questionnaire, and sent to all departmental members. Each respondent was asked to provide a "yes" or "no" response to each item. Any item approved by more than 75% of the respondents was to be included in the bag. All items gaining 50 to 75% approval were discussed with the Trauma Committee of the department to determine if their inclusion was warranted.

The response rate was 50%. The Table lists the 37 items gaining more than 75% approval.

Three items, the laryngeal mask (LMA) size 1, gum elastic bougie and Ayre's T-piece received 50 to 75% approval, and were included in the list of equipment following discussion with the Trauma Committee. The LMA size 1 has been shown to be useful in neonatal emergencies<sup>3</sup> and the gum elastic bougie is commonly included with the difficult airway equipment.<sup>4</sup>

The Ayre's T-piece anesthesia bag was a more popular choice than the self inflating bag as a device to provide positive pressure ventilation to the lungs.

TABLE Items gaining > 75% approval for inclusion in portable airway bag

<i>Items to be included</i>	<i>% Approval</i>
<i>Face mask</i>	
1	86%
2	95%
3	95%
4	90%
5	86%
<i>Guedel airway</i>	
3	81%
4	86%
5	95%
6	95%
7	100%
8	95%
9	81%
Straight blade size 1	95%
Curved blade size 3	90%
<i>Uncuffed endotracheal tubes</i>	
2.5	90%
3.0	90%
3.5	86%
4.0	86%
4.5	81%
5.0	76%
5.5	76%
<i>Cuffed endotracheal tubes</i>	
5.5	76%
6.0	90%
6.5	76%
7.0	86%
<i>Laryngeal mask</i>	
2	90%
3	95%
4	81%
Stylet	90%
Macgills forceps	76%
<i>Drugs</i>	
Propofol	76%
Suxamethonium	95%
Atropine	95%
Rocuronium	76%
Ketamine	76%

Perhaps the respondents had greater familiarity with the T-piece and were conscious of the ready availability of self inflating bags on all wards in at our institution.

We believe the reconstituted portable airway equipment bag we describe contains appropriate equipment to deal with immediate cardiopulmonary management problems in emergency situations.

Gordon Wong FANZCA

Ken Walsh FCARCSI

Hospital for Sick Children, Toronto, Canada

E mail: gordontcwong@hotmail.com

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## *Medium-/long-chain triglyceride emulsion reduced severity of pain during propofol injection*

To the Editor:

Injection pain is a common problem associated with the clinical use of propofol. Recently, free propofol in the aqueous phase was thought to be an important factor implicated in injection pain. Medium-/long-chain triglyceride (MCT/LCT) propofol is a new formulation,<sup>1</sup> in which free propofol in the aqueous phase has been reduced to 72.4% of the level in LCT propofol Diprivan™.<sup>2</sup> The purpose of the present randomized, double-blind study was to evaluate the potential of MCT/LCT propofol itself to decrease the incidence and severity of injection pain.

After approval of the Institutional Review Board and obtaining written informed consent, adult patients undergoing elective surgery participated in this study. No patient received premedication. Patients were randomly assigned to a LCT group or a MCT/LCT group. During induction, patients in the LCT group received Diprivan™ 1% (Astra Zeneca, Osaka, Japan), while those in the MCT/LCT group received 1% propofol Maruishi™ (Maruishi Pharmaceutical Co., Osaka, Japan). Both patients and anesthesiologists were blinded with respect to the formulation used. After establishing *iv* access, 2 mg·kg<sup>-1</sup> of propofol was manually injected at 1 mL·sec<sup>-1</sup>. During the propofol injection, patients were ques-

TABLE Demographic data and anesthetic condition

	LCT (n = 95)	MCT/LCT (n = 99)
Age (yr)	56.4 ± 16.4	57.8 ± 14.9
Gender (f/m)	43/52	42/57
Weight (kg)	59.8 ± 10.9	58.3 ± 10.5
ASA I/II	52/43	52/47
<i>Site of injection</i>		
Forearm vein	85 (89.5%)	91 (91.9%)
Dorsal vein of hand	10 (10.5%)	8 (8.1%)
<i>Cannula size</i>		
18/20/22 (gauge)	27/56/12	21/67/11
Dose of propofol (mg)	118.6 ± 24.8	118.2 ± 25.7
Time to loss of consciousness (sec)	46.0 ± 16.4	47.7 ± 18.1
<i>Incidence and severity of pain at injection site</i>		
INTENSITY OF INJECTION PAIN		
None	37 (38.9%)	50 (50.5%) P = 0.1056
Mild	29 (30.5%)	35 (35.4%) P = 0.4747
Moderate	25 (26.3%)	11 (11.1%) P = 0.0065
Severe	4 (4.2%)	3 (3.0%) P = 0.6595

LCT = long-chain triglyceride; MCT = medium-chain triglyceride.

tioned about the presence of pain at the injection site, and its severity was graded by the patients themselves using a four-point scale: 0 = no pain; 1 = mild, acceptable pain; 2 = moderate, uncomfortable pain; and 3 = severe, intolerable pain. Data were analyzed using the Chi-square test and t test.

Ninety-five patients were randomly allocated to the LCT group and 99 patients to the MCT/LCT group. The two study groups were comparable with respect to demographic characteristics, site of injection, cannula size, and induction time (Table). The MCT/LCT formulation significantly decreased the incidence of moderate injection pain when compared to the LCT group (11.1% *vs* 26.3%, *P* = 0.0065), and there was a tendency that the MCT/LCT formulation increased the incidence of mild or no pain. However, no statistically significant difference was apparent in the incidence of patients who felt no pain (50.5% in MCT/LCT *vs* 38.9% in LCT, *P* = 0.1056), (Table). These results suggest that reduction of free propofol concentration in the aqueous phase in the MCT/LCT formulation was not sufficient for complete prevention of injection pain.

In conclusion, while MCT/LCT formulation represents a better choice to reduce the severity of injection pain with propofol, supplemental medication to prevent injection pain should be considered for patients with low pain thresholds.

Namiko Nagao MD  
 Tokujiro Uchida MD PhD  
 Koichi Nakazawa MD PhD  
 Koshi Makita MD PhD  
 Tokyo Medical and Dental University Graduate  
 School, Tokyo, Japan.  
 E-mail: namiko@fg8.so-net.ne.jp  
 This study was supported by Maruishi  
 Pharmaceutical Co. Ltd. Osaka, Japan.

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### *Considerations aimed at facilitating the use of the new GlideScope® videolaryngoscope*

To the Editor:

The GlideScope® videolaryngoscope (Saturn Biomedical System Inc., Burnaby, BC, Canada) can exceed the utility of other instruments formerly considered indispensable in cases of foreseen difficult airway.<sup>1,2</sup> On the basis of our experience with this device, which includes 200 patients to date, we would like to offer a series of considerations:

1) Following difficulties to appropriately insert the laryngoscope blade when we began to use the device, we decided to modify the insertion technique in such a way as to use the instrument like a Guedel tube; that is, to insert the blade in the patient's mouth with the concave side looking up, before turning it 180° anticlockwise from the left to the right, to set it in place in the pharynx. This makes it possible to displace the tongue to the left and to minimize neck mobilization, while also allowing use of the device in cases of moderately limited mouth aperture.

2) "Steaming up" occurs to a greater or lesser degree. In our experience, optimal vision can be ensured with the GlideScope® by immersing the blade area containing the camera in lukewarm water for a few minutes before using the device.

3) We agree with Dr. Cooper<sup>3</sup> that the main problem of intubation with the GlideScope® has to do with passing the endotracheal tube (ETT) through a glottis that is in full view; this is because the lens invades the

blade channel. We have managed to solve this problem by using a thick, firm, 5.6-mm stylet. We also angulate the tube a little more than 60°. The ETT should be inserted with the concave side up, and must be turned clockwise from right to left while it is slid behind the videolaryngoscope, in such a way that it fits in between the device and the pharynx. This positions the tip of the ETT under the tip of the blade, and aims it correctly in the direction of the glottal orifice. Intubation difficulties with this device sometimes occur because the tip of the ETT collides with the anterior commissure of the glottis, a problem that can be minimized by turning the tube while it is inserted. On two occasions we solved this problem using a Fastrack® laryngeal-mask tube (LMA North America Inc., San Diego, CA, USA), which has a blunter tip than a conventional ETT. In both cases, we were able to slide it through the glottis easily, without causing trauma.

José V. Cuchillo MD\*

María A. Rodríguez MD†

Hospital La Fe,\* Hospital Malva-Rosa,† Valencia, Spain

E-mail: jjoselin@terra.es

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### REPLY:

*I am grateful for the opportunity of responding to the interesting letter from Drs. Cuchillo and Rodriguez.*

*Two recent publications are consistent with their comment that this device frequently provides comparable, but more frequently superior laryngeal exposure than direct laryngoscopy.<sup>1,2</sup> However, it may be difficult to introduce the laryngoscope blade into the mouths of patients with limited atlanto-occipital extension, reduced interincisor distance and/or a very protuberant chest. Their suggestion of introducing the laryngoscope upside down and rotating it as with a Guedel airway has not been previously described, and may prove helpful.*

*I am surprised by their comment concerning a foggy image. The transparent glass protecting the videochip is*

heated to eliminate condensation. There should be no need to warm the instrument nor should anti-fogging solutions be required. In well over 500 GlideScope® laryngoscopies, I have never experienced any fogging. This leads me to question whether their device has been damaged.

I believe that the last point raised by Drs. Cuchillo and Rodriguez really has two components, namely difficulty in delivering the endotracheal tube (ETT) to the glottis though easily seen, and passage of the ETT into the trachea. Regarding the delivery problem, some frequent users have successfully adapted different stylet configurations. At present, we do not know whether our recommended 60° configuration,<sup>2</sup> Doyle's 90°,<sup>3</sup> or Arndt's U-shape<sup>A</sup> produces the best results. It has been my experience that insertion of both the GlideScope® videolaryngoscope and the styletted-ETT in the midline generally results in correct alignment. This may, however, result in a significant angle of incidence between the laryngeal axis and the ETT. Several strategies may prove helpful: i) relaxing the elevation of the laryngoscope; ii) slight withdrawal of the laryngoscope; iii) applying external laryngeal pressure to depress the laryngeal inlet; and iv) insertion of a cudé-tipped gum elastic bougie and subsequent railroading of the ETT, both performed under visual control. The second problem, namely difficulty advancing the ETT, may be corrected by the above techniques that diminish the angle of incidence or the rotation that Cuchillo and Rodriguez (and Cooper)<sup>4</sup> described. Alternatively, the styletted-ETT can be shaped as above, however in a direction opposite to the inherent memory of the ETT. Removal of the stylet will then result in the tube migrating upward, as if rotation had been performed.

Richard M. Cooper MD FRCPC  
 Toronto General Hospital and University of  
 Toronto, Toronto, Canada  
 E-mail: richard.cooper@uhn.on.ca  
 Dr. Cooper is a consultant to Saturn Biomedical  
 Systems.

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