corniculate cartilages, could not be exposed. In their report, grades 1 and 2 were considered "adequate exposure" and grades 3 and 4 were considered "inadequate exposure". This classification differs from the currently popular Cormack and Lehane classification in one important respect.

Mallampati *et al.* considered a glottic view of either grade 3 or 4 to be a difficult laryngoscopy. Their original paper did not report a PPV, nor sensitivity or specificity. However, one can calculate from their data that the PPV was 14/15, or 93.3%. No other trial examining the modified Mallampati test has ever reported such a high PPV. There is a wide range of reported values for PPV for the modified Mallampati test in the literature. Most recent, well conducted trials examining the modified Mallampati test indicate a significantly lower PPV, which range from a low of 13%⁴ to a high of 65%.⁵ It is interesting to consider the factors which may account for the discrepancy between these published PPVs and the PPV value as calculated above.

Mallampati's study refers to the corniculate cartilages as an anatomic landmark, whereas most anesthesiologists currently refer to the arytenoid cartilages. Mallampati's grading system considers a view of arytenoids, alone, as a difficult laryngoscopy, and the majority of reported Mallampati grade 3 patients were in this group. Most anesthesiologists have since adopted the Cormack and Lehane system as the standard for grading laryngeal view; but this system does not regard a view of the arytenoids, alone, as a difficult laryngoscopy. In fact, Mallampati's grade 3 glottic view is equivalent to a Cormack and Lehane grade 2b view and, as such, is considered a good laryngoscopic view.

If Mallampati's original results were analyzed according to the Cormack and Lehane grading system, the results would be strikingly different. In this instance, of 15 reported patients with a class 3 oropharyngeal view, ten patients (66.7%) would have a good laryngoscopic view, suggesting easy laryngoscopic intubation, whereas only five patients (33.3%) would have had a poor laryngoscopic view, representing difficult intubation. This represents a PPV of 33.3%, which is more consistent with current estimates of the Mallampati PPV.

This assessment of the airway literature must not be interpreted as a criticism of Mallampati *et al.*'s original paper. At the time the paper was written, the Cormack and Lehane system of grading of laryngeal view was not in routine use. Further, the authors had no way of knowing that, over the next 20 years, the specialty of anesthesia would come to adopt a more

restricted laryngeal view as the threshold for difficult laryngoscopy. Rather, 20 years on, Dr. Mallampati and his colleagues should be congratulated on introducing a helpful and early classification of both oropharyngeal and laryngoscopic views.

In conclusion, Mallampati *et al.* reported the use of a predictive test which, in the context of their study, had excellent PPV. This may have generated the perception that Mallampati class 3 and 4 views have a high positive predictive accuracy for poor laryngeal view. Over the subsequent years, as experience and technology improved, our airway management skills have also evolved. Our specialty "moved the goalposts" with regards to which laryngoscopic view represents a difficult tracheal intubation. The factors discussed above have contributed to a common misperception that class 3 and 4 Mallampati views have a high positive predictive accuracy for what is currently accepted as being a difficult laryngoscopy.

Anthony M. O'Leary MBBS FC Anaes

Michael R. Sandison MD

Kevin W. Roberts MD

Albany Medical Center, Albany, USA

E-mail: olearya@mail.amc.edu

Accepted for publication January 9, 2008.

References

- 1 Mallampati SR, Gatt SP, Gugino LD, *et al.* A clinical sign to predict difficult intubation: a prospective study. *Can Anaesth Soc J* 1985; 32: 429–34.
- 2 Samsoon GL, Young JR. Difficult tracheal intubation: a retrospective study. *Anaesthesia* 1987; 42: 487–90.
- 3 Cormack RS, Lehane J. Difficult tracheal intubation in obstetrics. *Anaesthesia* 1984; 39: 1105–11.
- 4 Khan ZH, Kashfi A, Ebrahimkhani E. A comparison of the upper lip bite test (a simple new technique) with modified Mallampati classification in predicting difficulty in endotracheal intubation: a prospective blinded study *Anesth Analg* 2003; 96: 595–9.
- 5 Gupta S, Pareek S, Dulara SC. Comparison of two methods for predicting difficult intubation in obstetric patients. *Middle East J Anesthesiol* 2003; 17: 275–85.

Topicalization of the airway for fiberoptic intubation

To the Editor:

I read, with interest, the recent letter written by Dr. Xue *et al.*,¹ which reported a clever technique to topicalize the airway in patients with predicted difficult intubation. The process involved combining the fibre-

optic bronchoscope (FOB) with the MADgic spray atomizer (Wolfe Tory Medical Inc., Salt Lake City, UT, USA) and holding the two devices together using a lactoprene tube. The combined technique appears interesting, but, unfortunately, details regarding the manufacturer of the lactoprene tube were not provided. Such information would be helpful for others who would like to try this technique.

The authors stated that the FOB cannot provide topical anesthesia as effectively as transtracheal injection of lidocaine, and that this limitation might be related to an inability to create a fine spray via the working channel of the FOB or by means of an epidural catheter. However, a previous report described a technique which created a fine spray of local anesthesia via an epidural catheter passed through the FOB, and this technique provided effective anesthesia for awake intubations.² In that report, in order to create the fine spray, the proximal end of the epidural catheter was attached to a three-way tap and an oxygen supply.

Although an effective technique, there are potential disadvantages that were not discussed by Dr. Xue *et al.*¹ Is it possible for the lactoprene tube to disconnect during insertion and present a foreign body in the airway? Furthermore, performing a tracheal intubation with the set-up would necessitate removing the combined apparatus, to facilitate railroading a tracheal tube over the FOB and reintroducing the FOB for the intubation. When using the epidural catheter technique, the catheter can be used for the spray and then removed. Next, a tube, previously placed over the FOB, can be passed, without first having to remove the FOB.

Steven M. Neustein MD

Mount Sinai Medical Center, New York, USA

E-mail: steve.neustein@msnyuhealth.org

Accepted for publication January 10, 2007.

References

- 1 Xue FS, Yang QY, Liao X, Liu JH, Tong SY. Topical anesthesia of the airway using fiberoptic bronchoscope and the MADgic atomizer in patients with predicted difficult intubation. *Can J Anesth* 2007; 54: 951–2.
- 2 Williams KA, Barker GL, Harwood RJ, Woodall NM. Combined nebulization and spray-as-you-go topical local anaesthesia of the airway. *Br J Anaesth* 2005; 95: 549–53.

Reply:

We thank Dr. Neustein for his interest and comments regarding our article. The lactoprene tube, used to hold the fiberoptic bronchoscope (FOB) together with the

MADgic spray atomizer, is a common medical tube with an internal diameter of 5 mm and a wall thickness of 0.8 mm (Tuoren Medical Instruments Inc, Xinxiang, Henan, China). Due to its pliable texture and excellent elasticity, the lactoprene tube is often used as a sheath for the pediatric metal restraint in our hospital to prevent teeth and tissue damage.

The applicator portion of the MADgic® atomizer has a thickened anterior end 12 mm long, and an external diameter of 4 mm. The external diameters of the different adult versions of the Olympus FOB (Olympus Corporation, Tokyo, Japan), range from 3.1 to 5.1 mm. Therefore, the lactoprene tube can combine the two devices tightly together. Both the tight combination of the two devices and the thickened anterior end of the MADgic® atomizer can effectively prevent disconnection of the lactoprene tube and can also prohibit any foreign body from entering the airway during insertion.

It must be emphasized that the maximum length of the lactoprene tube should not exceed 3 cm, in order to decrease its influence on the bending ability of the distal section of the FOB. Before insertion, moreover, the applicator portion must be bent according to an individual patient's airway anatomy and the natural curve of the FOB. These factors help to induce the tip of the FOB-MADgic® unit into the different target sites, and help to keep the device stationary during the spraying of lidocaine.

In clinical practice, we have also used the "spray as you go" technique via an epidural catheter passed through the FOB, to produce local anesthesia of the airway in the patients with predicted difficult intubation.¹ According to our experience and the results of previous studies,^{2,3} using this technique alone cannot provide the optimal local anesthesia of the airway for fiberoptic bronchoscopy and tracheal intubation. The following factors may account for the inadequacy of this technique. Firstly, the local anesthetic injected by an epidural catheter cannot be reduced to extremely fine, cloud-like particles; and, secondly, the stream of local anesthetic cannot be directed, with any great deal of accuracy, to the targeted sites. In the study by Williams *et al.*,⁴ effective local anesthesia of the airway for awake intubations, is indeed achieved by a modified "spray-as-you-go" technique. Before initiation of the "spray-as-you-go" technique, however, all patients received a nebulization of 4% lidocaine (a total of 200 mg). Two millilitres 5% lidocaine (100 mg) containing 0.5% phenylephrine and four aliquots (40 mg) of 10% lidocaine were also sprayed into the nose and oropharynx, respectively. Without a doubt, these measures can improve the effectiveness of airway local anesthesia.

To achieve satisfactory intratracheal topical

anesthesia, we allow a five-minute waiting period after the tracheal spray. Three to five minutes of contact time is usually required to provide adequate penetration of local anesthetic into the airway mucosa for maximal effect.⁵ Although fiberoptic intubation can be performed immediately after using an epidural catheter passed through the FOB to spray local anesthetic in the trachea, inadequate intratracheal topical anesthesia will inevitably occur.¹

Fu S. Xue MD

Quan Y. Yang MD

Xu. Liao MD

Plastic Surgery Hospital, Chinese Academy of Medical Sciences and Peking Union Medical College Beijing, People's Republic of China
E-mail: fruitxue@yahoo.com.cn or
profxfuefushan@xxmu.edu.cn

References

- 1 Xu YC, Liao X, Xue FS. Four noninvasive local anesthesia techniques of the airway (Chinese). *Forum Anesth Monit* 2005; 6: 363–6.
- 2 Kundra P, Kutralam S, Ravishankar M. Local anaesthesia for awake fiberoptic nasotracheal intubation. *Acta Anaesthesiol Scand* 2000; 44: 511–6.
- 3 Frosh AC, Jayaraj S, Porter G, Almeyda J. Is local anaesthesia actually beneficial in flexible fiberoptic nasendoscopy? *Clin Otolaryngol Allied Sci* 1998; 23: 259–62.
- 4 Williams KA, Barker GL, Harwood RJ, Woodall NM. Combined nebulization and spray-as-you-go topical local anaesthesia of the airway. *Br J Anaesth* 2005; 95: 549–53.
- 5 Randell T, Yli-Hankala A, Valli H, Lindgren L. Topical anaesthesia of the nasal mucosa for fiberoptic airway endoscopy. *Br J Anaesth* 1992; 68: 164–7.

Use of a bougie to overcome malposition of the Airway Scope during difficult tracheal intubation

To the Editor:

The Airway Scope, AWS-S100 (Pentax Corporation, Tokyo, Japan), is a new video laryngoscope that has shown promising results in patients with difficult airways.^{1,2} It consists of a handle with liquid crystal device (LCD) screen, a light source and camera system, and a disposable, rigid blade (PBlade, known as the INTLOCK in Japan). We report successful tracheal intubation in a patient using the Airway Scope, despite an inability to achieve ideal placement of the PBlade.

Our patient, a 60-yr-old man had urological surgery in the prone position. He had marked retrognathia, a small mouth opening, a Mallampati class 3 oropharyngeal view, a limited neck extension, and a history of difficult tracheal intubation. After preoxygenation and induction of general anesthesia, we ascertained that bag mask ventilation was possible before inducing muscle relaxation. Our patient had a Cormack and Lehane grade 4 view, on direct laryngoscopy using a Macintosh laryngoscope. We used the Airway Scope and were able to fully visualize the larynx. However, we could not correct the malposition of the PBlade tip in the vallecula, and we were unable to optimize the PBlade tip position beneath the epiglottis. Attempting to intubate the trachea, with such suboptimal positioning, would most likely cause impingement of the tracheal tube on the epiglottis and result in failed intubation. It could also bring about airway trauma. Therefore, we inserted a bougie through the tracheal tube that was mounted on the PBlade, centered the target symbol of the Airway Scope's LCD monitor on the glottis, and inserted the bougie through the glottis. We then detached the tracheal tube from the PBlade and easily railroaded the tracheal tube through the glottis. The Airway Scope enabled two anesthesiologists to view the entire process simultaneously. The patient did not experience any fall in oxygen saturation.

Our patient's small mouth opening and dentition limited maneuverability of the PBlade and resulted in our inability to place the PBlade beneath the epiglottis. In a recent report of failed tracheal intubation, despite visualization of the glottis with the Airway Scope, the authors had similar PBlade placement difficulties, due to their patient's long thyromental distance of 9.5 cm.³ Difficulties experienced with the usage of straight, reinforced tracheal tubes, rather than the preformed, curved tubes with the Airway Scope, can also be overcome with a bougie.⁴ We suggest that use of a bougie with the Airway Scope may overcome some of the current limitations of a fixed PBlade's size and curvature.

Bee H. Tan MMed (Anaesthesia)

Usha Narasimhan FRCA

Eugene H.C. Liu FRCA

National University Hospital, Singapore

E-mail: tbh1102@gmail.com

The authors have no competing interests pursuant to this report.

Accepted for publication January 16, 2008.