

## Bronchoscope-guided intubation through a Laryngeal Mask Airway Supreme in a patient with a difficult-to-manage airway

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### Abstract

We report a case of an obese patient who presented with laryngeal edema and difficult ventilation after failed attempts to intubate. A Laryngeal Mask Airway Supreme (LMA Supreme) reestablished the ventilation and allowed bronchoscope-guided intubation of the trachea. The case suggests that the LMA Supreme may be useful in patients with a difficult airway.

**Key words** Bronchoscope · Difficult airway · Laryngeal mask · Obesity

### Introduction

The anesthesiologist may face the challenge of a difficult airway at any time. New ventilatory devices are changing the practical approach to difficult intubation and changing the guidelines from professional societies [1,2]. In obese patients, a difficult intubation presents more frequently in association with certain clinical features (i.e., high Mallampati score, a medical history of obstructive sleep apnea, a large neck circumference) but can present without any predicting features [3,4]. We report on an obese patient with unanticipated difficult intubation that was successfully managed with a Laryngeal Mask Airway (LMA) Supreme (Orthofix, Bussolengo, VR, Italy).

### Case report

A 57-year-old woman was scheduled for elective laparoscopic sleeve gastrectomy for morbid obesity under general anesthesia. Ten and eight years previously, she had had uneventful general anesthesia for the place-

ment of a bioenteric intragastric balloon and for an appendectomy. The patient appeared as an obese white female (weight, 132 kg; height, 150 cm; body mass index, 58.6 kg·m<sup>-2</sup>), with a thick neck (48-cm circumference) and a full range of motion of her cervical spine. Thyromental distance was 6 cm, maximal voluntary mouth opening 4 cm, and Mallampati score II.

After preoxygenation of 5 min, rapid sequence anesthesia was induced intravenously with fentanyl 100 µg, followed by propofol 2 mg·kg<sup>-1</sup> and succinylcholine 1 mg·kg<sup>-1</sup>. Three attempts to intubate were carried out with and without cricoid pressure by a staff anesthesiologist, and a fourth attempt was made by a senior anesthesiologist, with the help of a Frova airway intubating introducer (Cook Critical Care, Bjaeverskov, Denmark) and all failed. Despite optimal repositioning of the head and of the neck, the Cormack-Lehane view was 3b. After the failed attempts, face mask ventilation became difficult and ineffective (percutaneous oxygen saturation [S<sub>PO<sub>2</sub></sub>] <90 %). An LMA-Supreme size 4 (9.5-mm minimal inner diameter; Orthofix) was inserted easily and reestablished effective ventilation (ventilatory parameters: pressure controlled ventilation 30 cm H<sub>2</sub>O, tidal volume 550 and 780 ml, before and after draining of gastric fluids), and oxygenation (S<sub>PO<sub>2</sub></sub>, 100%) at approximately 3 min after induction of anesthesia. At this time, the decision was made, at first, to wake the patient. Because during emergence hypoxia (S<sub>PO<sub>2</sub></sub> < 85 %) was developing when the patient was allowed to breathe spontaneously without assistance, the decision was changed to continue with a bronchoscope-assisted intubation and to prepare for possible cricothyroidotomy. With the mask in situ, deep anesthesia was reinduced with propofol 2.0 mg·kg<sup>-1</sup> and succinylcholine 1 mg·kg<sup>-1</sup> and ventilation and oxygenation were restored. After a bronchoscopy adapter swivel elbow piece was attached to the mask and connected to the ventilator tubing, a bronchoscope (Pentax FI-10BS; Pentax, Tokyo, Japan) with an endotracheal tube (Rusch

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Teleflex Medical, Kernen, Germany; 6.0-mm inner diameter, 8.0-mm outer diameter) mounted on it was guided through the LMA-Supreme into the trachea. The laryngeal inlet was visible and the supraglottic and glottic mucosa were markedly swollen. After the airway had been rescued, it was decided to continue with the surgery and to replace the small endotracheal tube with a larger one that reduces the patient's work of breathing during recovery. The bronchoscope was replaced by a 4.0-mm Cook airway exchange catheter (Cook Critical Care), and the first endotracheal tube was removed, along with the LMA-Supreme, and replaced with a second, larger endotracheal tube (Rusch Teleflex Medical; 7.5-mm inner diameter, 10-mm outer diameter) railroaded into the trachea. The surgery was uneventful and the patient was then kept anesthetized for 24 h and sedated for a further 24 h in the intensive care unit, until the laryngeal swelling resolved. She was discharged home on postoperative day 5. There was no bronchoscopic or clinical evidence of pulmonary aspiration. The patient gave her consent to the publication of her case.

## Discussion

In a "cannot intubate, cannot ventilate" scenario, adequate ventilation of the patient's lungs must be reestablished with the most familiar and effective tool to avoid the risk of hypoxic brain damage, cardiac arrest, and death. Laryngeal masks are recommended by professional societies for airway rescue in failed intubation, and different models have been used [1,2]. In our patient, after tracheal intubation had failed, the LMA Supreme was inserted easily and allowed effective ventilation. Older models of laryngeal masks, such as the LMA-Classic and LMA-ProSeal, have proven to be useful to rescue the airway in a quick and safe fashion [5,6]. In comparison to older models, the LMA Supreme has several enhanced features, including the elliptical cross-sectional design of the airway tube, which facilitates insertion; a rigid airway tube and a reinforced tip that prevent kinking and folding; and a larger cuff and a gastric access that improve protection of the airway [7]. Thanks to its features, the LMA Supreme has higher success rates than previous models for novice users [8,9]. Finally, the LMA Supreme had already been reported to work as an alternative ventilatory device in difficult airways [8,10,11].

A limitation and concern in using supraglottic devices in obese patients is that they may require ventilatory pressures exceeding the cuff seal pressure, thus posing the risk of aspiration [2]. The LMA Supreme allows the placement of a gastric tube and, as has been shown recently, it allows an optimal laryngeal fit also in obese

patients with a body mass index above  $35 \text{ kg}\cdot\text{m}^{-2}$  [12]. In direct comparison studies, the LMA Supreme had oropharyngeal leak pressures lower than [13] or similar to those of the LMA-ProSeal [14]. More clinical studies are needed before specific recommendations can be made on the use of the LMA Supreme in obese patients.

More importantly, and although it is not designed for intubation purposes, the LMA Supreme allowed a fiberscope-guided intubation of our patient in the presence of laryngeal edema. The LMA Supreme had already shown a satisfactory use for bronchoscopic-guided intubation in patients with a difficult airway [8,10,11]. In a recent study, it enabled an optimal bronchoscopic view of the larynx in all 99 patients including 10 obese patients [12]. As regards endotracheal tube insertion through the mask, in our hands a 6.0 endotracheal tube (6.0-mm inner diameter, 8.0-mm outer diameter) could be pushed rather easily through the LMA Supreme and its tip protruded approximately 80 mm from the cuff level. Although 7.0-mm tubes have been inserted through the LMA Supreme [10], a 6.5 tube (6.5-mm inner diameter; 9.4-mm outer diameter) can be passed with some difficulty and 7.0 (7.0-mm inner diameter; 10.0-mm outer diameter) or larger tubes cannot be passed through the LMA Supreme size 4 available to us. Differences between our experience and those of others may depend on personal skills or differences in manufacturing of the mask.

In conclusion, the LMA Supreme allowed airway rescue and, after the airway had been secured, it allowed fiberscope-guided intubation in a patient with laryngeal edema from failed intubation. This study further supports the potential utility of the LMA Supreme in patients with a difficult airway.

## References

1. American Society of Anesthesiologists Task Force on Management of the Difficult Airway. Practice guidelines for management of the difficult airway: an updated report by the American Society of Anesthesiologists Task Force on Management of the Difficult Airway. *Anesthesiology*. 2003;98:1269–77.
2. Henderson JJ, Papat MT, Latto IP, Pearce AC. Difficult Airway Society. Difficult Airway Society guidelines for management of the unanticipated difficult intubation. *Anaesthesia*. 2004;59:675–94.
3. Todd DW. Anesthetic considerations for the obese and morbidly obese oral and maxillofacial surgery patient. *J Oral Maxillofac Surg*. 2005;63:1348–53.
4. Juvin P, Lavaut E, Dupont H, Lefevre P, Demetriou M, Dumoulin JL, Desmots JM. Difficult tracheal intubation is more common in obese than in lean patients. *Anesth Analg*. 2003;97:595–600.
5. Langeron O, Amour J, Vivien B, Aubrun F. Clinical review: management of difficult airways. *Crit Care*. 2006;10:243–9.
6. Ramachandran K, Kannan S. Laryngeal mask airway and the difficult airway. *Curr Opin Anaesthesiol*. 2004;17:491–3.

7. van Zundert A, Brimacombe J. The LMA Supreme—a pilot study. *Anaesthesia*. 2008;63:209–10.
8. Ferson DZ, Chi L, Zambare S, Brown D. The effectiveness of the LMA Supreme™ in patients with normal and difficult-to-manage airways (abstract). *Anesthesiology*. 2007;107:A592.
9. Verghese C, Ramaswamy B. LMA-Supreme—a new single-use LMA with gastric access: a report on its clinical efficacy. *Br J Anaesth*. 2008;101:405–10.
10. Mathes AM, Wrobel M, Reus E, Rensing H, Grundmann U. Fiberoptic-guided intubation via the Laryngeal Mask Airway Supreme. *J Clin Anesth*. 2008;20:322–3.
11. Pearson DM, Young PJ. Use of the LMA-Supreme for airway rescue. *Anesthesiology*. 2008;109:356–7.
12. Timmermann A, Cremer S, Eich C, Kazmaier S, Bräuer A, Graf BM, Russo SG. Prospective clinical and fiberoptic evaluation of the Supreme laryngeal mask airway. *Anesthesiology*. 2009;110:262–5.
13. Eschertzhuber S, Brimacombe J, Hohlieder M, Keller C. The laryngeal mask airway Supreme—a single use laryngeal mask airway with an oesophageal vent. A randomised, cross-over study with the laryngeal mask airway ProSeal in paralysed, anaesthetised patients. *Anaesthesia*. 2009;64:79–83.
14. Hosten T, Gurkan Y, Ozdamar D, Tekin M, Toker K, Solak M. A new supraglottic airway device: LMA-Supreme, comparison with LMA-Proseal. *Acta Anaesthesiol Scand*. 2009;53:852–7.