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### USE OF THE LARYNGEAL MASK AIRWAY WITH POSITIVE PRESSURE VENTILATION IN AN ASTHMATIC PATIENT

Reported is a case of a radical prostatectomy under general anesthesia with a Laryngeal Mask Airway (LMA). The patient had a previous history of severe bronchospasm. The advantages of the LMA in this situation are discussed.

#### Introduction

A 55 year old man, 5'8" and 180 pounds, was admitted on the day of surgery for radical prostatectomy. The patient had a significant history of asthma, with several hospital admissions. One admission included intubation in the intensive care unit less than one month prior to the date of surgery. The patient was offered regional anesthesia (epidural) for the scheduled surgery, but declined.

#### Surgical Procedure

After pretreatment with an albuterol inhaler (2 puffs self-administered by the patient) and glycopyrolate, the patient was induced with 2mg/kg of propofol, 2 µg/kg of fentanyl, and 0.7mg/kg of vecuronium. An oral gastric tube was placed and a size 5 LMA-Classic inserted using the method described by Brain.<sup>1</sup> The anesthetic was maintained with isoflurane, intravenous fentanyl, and vecuronium. The patient was placed in a supine, extended position in order to maximize surgical access to the pelvis. This position placed the head and torso in a moderately downward position. Peak inspiratory pressure never exceeded 25 cm of water pressure. The procedure continued under controlled ventilation for 4 hours. After resection of the prostate and urethral anastomosis, the patient was returned to a supine position. After the abdominal musculature was repaired, neuromuscular blockade was reversed, and the patient was allowed to breathe spontaneously. At the completion of the procedure, the inhaled anesthetic agent was discontinued and the patient was allowed to emerge. When the patient obeyed commands to open the mouth, the oral cavity was gently suctioned and the LMA was removed, fully inflated. The LMA was coated with thickened saliva on the pharyngeal aspect but was clean on the laryngeal aspect.

#### Discussion

The laryngeal mask airway was introduced in the United States in the early 1990's as a substitute for the face mask in cases where spontaneous ventilation was maintained. Soon afterwards, it was realized that this device also could function in situations in which endotracheal intubation had become the standard mode of ventilatory management.<sup>2</sup> A number of case reports and clinical trials have shown that a wide variety of surgical procedures are safely managed with the LMA. These include situations requiring positive pressure ventilation, intraoral and intranasal surgery, intraabdominal and pelvic surgery, and bronchoscopy.<sup>2, 3, 4</sup> Concerns regarding regurgitation and aspiration limited the initial acceptance of the LMA, but in low risk patients there have been few problems reported.<sup>5, 6</sup> Patients in the lithotomy position have been noted to have increased passive regurgitation with the LMA, but this has not been accompanied by an increase in aspiration. The overall rate of aspiration with the LMA in low risk patients is equal to that in tracheally intubated patients.<sup>7</sup> Even low aspiration risk abdominal surgery patients, undergoing open laparotomy, abdominal laparoscopy and pelvic laparoscopy, have been safely managed in this way.<sup>3, 8, 9, 10</sup>

Asthma, or bronchospasm, is a disease of hyperreflexivity of the bronchial smooth muscle. Intrinsic and extrinsic forms exist. In the intrinsic bronchospasm patient, no clear stimulus to bronchoconstriction exists. With extrinsic asthma the patient can have bronchospasm triggered by environmental pollutants, allergic reaction, cold, foreign bodies, and drying of the mucosa. It can be treated by removing the offending stimulus and by giving the patient  $\beta_2$  agonists and steroids. The LMA presents a unique opportunity for the clinician to effectively control the airway without having to introduce a foreign body in to the trachea. Thus, it is an ideal airway tool in the asthmatic patient who is not at risk for reflux and aspiration. Patients managed with the LMA have less evidence of reversible bronchoconstriction than those managed

with a tracheal tube.<sup>11</sup> Because the halogenated inhaled anesthetics are potent bronchodilators, the patient at risk for bronchospasm is most likely to wheeze when they are discontinued and the patient begins to emerge. In the patient managed with the LMA, there is no foreign body in the sensitive broncho-respiratory tree and the patient can be fully emerged prior to removal of the device. In the event that uncontrollable bronchospasm does occur intraoperatively (e.g. from vagal stimuli such as traction on the peritoneum), intubation can be performed through the LMA<sup>12</sup> or after LMA removal.

When an LMA is used as the primary airway management technique, a naso- or oral gastric tube can be used as indicated by the surgery. It may be placed before the insertion of the LMA, or behind the LMA after it has been inserted. Modest deflation of the mask may facilitate gastric tube insertion.<sup>13</sup>

### Summary

In the current case, the LMA provided a practical and safe alternative to endotracheal intubation. It affords a special advantage to the patient with bronchospastic disease by allowing airway control without manipulation of the sensitive larynx or trachea. Positive pressure ventilation, gastric tube placement and non-supine positioning are all possible with LMA use.<sup>14</sup>

Though it is recommended that the clinician become experienced with basic LMA use before applying it to unconventional cases, it is apparent that the scope of its applicability is far greater than previously appreciated.

### References

- 1) Brain A.I.J., Denman W.T., Goudsouzian N.G. *LMA-Classic and LMA-Flexible Instruction Manual*. 1999 February
- 2) Rosenblatt W.H., Ovassapian A., Eige S. Use of the laryngeal mask airway in the United States: A Randomized Survey of ASA Members. *Anesthesiology* 1998;89 (Supplement 3A):A575
- 3) Verghese C. Survey of laryngeal mask airway usage in 11,910 patients: safety and efficacy for conventional and nonconventional usage. *Anesth Analg* 1996;82(1): 129-133
- 4) Keller C., Sparr H.J., Luger T.J., Brimacombe J. Patient outcomes with positive pressure versus spontaneous ventilation in non-paralysed adults with the laryngeal mask. *Can J Anaesth* 1998;45(6):564-567

- 5) Agro F., Brimacombe J., Verghese C., Carassiti M., Cataldo R. Laryngeal mask airway and incidence of gastro-oesophageal reflux in paralysed patients undergoing ventilation for elective orthopaedic surgery. *British Journal of Anaesthesia* 1998;81(4):537-539
- 6) McCrory C.R., McShane A.J. Gastroesophageal reflux during spontaneous respiration with the laryngeal mask airway. *Can J Anaesth* 1999;46(3):268-270
- 7) Brimacombe J.R., Berry A. The incidence of aspiration associated with the laryngeal mask airway: A meta-analysis of published literature. *J Clin Anesth* 1993;7:297-305
- 8) Skinner H.J., Ho B.Y., Mahajan R.P. Gastro-oesophageal reflux with the laryngeal mask during day-case gynaecological laparoscopy. *Br J Anaesth* 1998;80(5):675-676
- 9) Bapat P.P., Verghese C. Laryngeal mask airway and the incidence of regurgitation during gynecological laparoscopies. *Anesth Analg* 1997;85(1):139-143
- 10) Tobias J.D., Holcomb G.W.III., Rasmussen G.E., Lowe S., Morgan W.M. III. General anesthesia using the laryngeal mask airway during brief, laparoscopic inspection of the peritoneum in children. *J Laparoendosc Surg* 1996;6(3):175-180
- 11) Kim E.S., Bishop M.J. Endotracheal intubation, but not laryngeal mask airway insertion, produces reversible bronchoconstriction. *Anesthesiology* 1999;90(2):391-394
- 12) Benumof J.L. Laryngeal mask airway and the ASA difficult airway algorithm. *Anesthesiology* 1996;84:686-699
- 13) Graziotti J. Intermittent positive pressure ventilation through a laryngeal mask airway - is a nasogastric tube useful? *Anaesthesia* 1992;47:1088-1089
- 14) Brimacombe J.R., Brain A.I.J., Berry A.M. *The Laryngeal Mask Airway - A Review and Practical Guide (Chapter 12-Advanced Uses: Techniques)*. 1997;144-152