Protection from aspiration with the LMA-ProSeal™ after vomiting: a case report

[La protection contre l'aspiration avec le ML-ProSeal™ après des vomissements : une étude de cas]

David A. Mark MD FRCPC

Purpose: To describe a case of vomiting with a laryngeal mask airway ProSeal™ (PLMA) *in situ*. The new design features of the PLMA and their role in protection from aspiration are discussed.

Clinical features: A 27-yr-old female underwent bilateral reduction mammoplasty under general anesthesia utilizing a PLMA for airway management. During transfer to the postanesthesia care unit, she had an episode of active vomiting with the PLMA still *in situ*. The vomitus was expelled via the drain tube bypassing the pharynx entirely. Clinically, there was no evidence of aspiration and the patient had an uneventful recovery.

Conclusion: This case provides evidence that the drain tube of the PLMA directs vomitus away from the airway when properly positioned and may have prevented aspiration in an anesthetized patient.

Objectif : *Décrire un cas de vomissements en présence du masque laryngé ProSeal™ (MLP) in situ. Les nouvelles particularités du MLP et leur rôle dans la protection contre l'aspiration sont discutés.*

Éléments cliniques : *Une femme de 27 ans a subi une mammoplastie de réduction bilatérale sous anesthésie générale avec emploi d'un MLP pour l'ouverture des voies aériennes. Pendant le transfert à la salle de réveil, elle a eu des vomissements et le MLP était toujours en place. Les vomissement ont été évacués grâce à l'orifice de drainage protégeant le pharynx. Il n'y a pas eu de signe évident d'aspiration et la patiente a connu une récupération sans incident.*

Conclusion : *Ce cas apporte la preuve que le drain du MLP a permis de retirer les vomissements des vois aériennes quand il est bien mis en place. Il peut empêcher l'aspiration chez un patient anesthésié.*

ASPIRATION of gastric contents is a serious and potentially fatal complication of anesthesia. There are numerous case reports of aspiration following regurgitation or vomiting with the laryngeal mask airway (LMA).[1–5] The new LMA-ProSeal™ (PLMA; The Laryngeal Mask Company, Henley on Thames, UK) has been designed to decrease the risk of aspiration,[6] however, only a single cadaveric study[7] addresses this issue in the literature. I present a case of vomiting in an anesthetized patient with a PLMA *in situ*.

Case report

A 27-yr-old, 84 kg female was scheduled for reduction mammoplasty. She had a negative personal and family history for anesthetic problems. Review of systems included irritable bowel syndrome and mild asthma, which were well controlled. She denied gastroesophageal reflux. Medications were salbutamol *prn* and depot medroxyprogesterone every three months. There were no known drug allergies.

The patient had no solid food after midnight and last had clear fluids four hours preoperatively. She received oral naproxen 550 mg and acetaminophen 975 mg 90 min preoperatively with sips of water. She underwent bilateral reduction mammoplasty under general anesthesia utilizing a PLMA #4 for airway management. The PLMA was easily inserted and inflated with 30 mL of air. Gas leak from the drain tube was assessed according to the manufacturers instructions (LMA-ProSeal™ instruction manual): a small amount of gel was placed at the proximal end of the drain tube and observed for bubbles while manually ventilating through the PLMA. After ensuring an absence of gas leak from the drain

From the Department of Anesthesiology, Kingston General Hospital, Kingston, Ontario, Canada.
Address correspondence to: Dr. David A. Mark, Department of Anesthesiology, Kingston General Hospital, 76 Stuart Street, Kingston, Ontario K7L 2V7, Canada. Phone: 613-548-7827; Fax: 613-548-1375; E-mail: markd@kgh.kari.net
Accepted for publication June 3, 2002.
Revision accepted September 9, 2002.

tube at 30 cm H_2O pressure, the patient was ventilated via the PLMA with the following settings: tidal volume = 550 mL, respiratory rate = 10·min^{-1} with a resultant peak inspired pressure of 10 cm H_2O. The surgery proceeded uneventfully. After resuming spontaneous ventilation, the patient was transferred to the postanesthesia care unit (PACU) in the lateral position breathing room air through the PLMA. Her O_2 saturation (SpO_2) was 97% upon leaving the operating room. As the patient reached the PACU, she vomited copious amounts of bile stained fluid through the drain tube of the PLMA forcefully enough to splatter the PACU doors. She didn't cough either before or after vomiting. A pulse oximeter was immediately applied and measured an SpO_2 of 95%. The oropharynx was suctioned for scant clear secretions but no bile stained fluid was obtained. After oral suctioning, the patient regained consciousness and the PLMA was removed with the cuff inflated. Inspection of the surface of the PLMA over the glottis (and of the entire mask) revealed no evidence of bile stained fluid other than in the drain tube lumen and on the tip of the mask immediately surrounding this orifice. Initial vital signs in the PACU were: SpO_2 = 95% on room air, heart rate = 85·min^{-1}, blood pressure = 150/65 mmHg. Auscultation of the lungs revealed good air entry bilaterally with no adventitial sounds heard. Her SpO_2 remained 96–97% on room air. The remainder of her stay was unremarkable and she was discharged home the next morning as planned.

Discussion

The aspiration of gastric contents is a rare but potentially serious adverse event in the perioperative period. Warner *et al.*[8] estimates an incidence of 11:10,000 for emergency surgery and 2.6:10,000 for elective surgery with an overall mortality of 0.14 per 10,000. A meta-analysis by Brimacombe and Berry[9] estimated the incidence to be roughly 2:10,000 (5:24,562) with no reported cases of mortality when the LMA was used as the primary form of airway management. Whether or not the LMA predisposes patients to aspiration is controversial. Some studies suggest it does[10,11] while others suggest no effect.[12]

Two case reports[1,3] have suggested the LMA may "reflect" gastric contents into the trachea during vomiting. While Brain[13] has suggested that the LMA may limit the amount of fluid aspirated by physically obliterating the pharynx, Nanji and Maltby[1] suggest the opposite in their case report of a near fatal pulmonary aspiration.

While the design of the PLMA addresses this concern by providing a "drainage tube" or gastric lumen to allow for escape of gastric contents,[6] published reports supporting or refuting its effectiveness in this regard are scant. Keller *et al.*[7] showed that the PLMA (cuff inflated) allowed esophageal fluid to bypass the pharynx and mouth in a cadaver model. Agrò *et al.*[14] described the successful use of a double lumen gastric LMA for upper gastrointestinal endoscopy in a patient with achalasia under general anesthesia. Brimacombe described a case where a prototype PLMA effectively shielded the glottis from gastric contents during an episode of intraoperative regurgitation.[15] Evans *et al.*[16] have reported a case where passive regurgitation through the drain tube occurred intraoperatively with no evidence of aspiration. In that case report, the PLMA was left in place and the procedure was completed uneventfully.

The effects of vomiting in the presence of the PLMA remain unclear. In the present report, the gastric lumen of the PLMA directed vomitus away from the airway with possible prevention of aspiration in an anesthetized patient. Brimacombe and Berry[9] suggests that aspiration is less likely with vomiting than regurgitation since the glottis is closed. This argument cannot alone account for the absence of signs of aspiration in this patient since there was no evidence of bile stained fluid in the glottic bowl of the PLMA.

Strategies to decrease the incidence of aspiration include an appropriate preoperative assessment for risk factors, establishment of preoperative fasting guidelines, verification of patient compliance with these guidelines and pharmacologic therapies to decrease gastric volume and/or acidity. Although silent aspiration around cuffed endotracheal tubes (ETT) has been well documented,[17,18] awake intubation or a rapid sequence induction with a cuffed ETT remains the gold standard for patients at risk of aspiration requiring a general anesthetic. A gastric tube may be used to decrease the volume of gastric contents but does not guarantee complete emptying of the stomach and may interfere with gastroesophageal sphincter integrity.[19] A gastric tube may also be inserted through the drain tube of the PLMA to facilitate emptying of gastric contents. While this may help confirm correct positioning of the drain tube orifice of the PLMA, these gastric tubes would have the same limitations as those inserted without the benefit of the PLMA. Unlike a gastric tube or ETT, the PLMA allowed gastric contents to completely bypass the pharynx during vomiting in this case. Susceptibility of the drain tube to blockage by solids remains to be determined and should be considered when selecting a PLMA for airway management. How this strategy for decreasing risk of aspiration compares with a cuffed ETT merits further consideration.

Although aspiration remains a concern, the LMA has proven itself to be an invaluable airway device. The new design features of the PLMA should decrease the risk of aspiration. This case demonstrates that in contrast to standard ETT or gastric tubes, the PLMA may allow regurgitated or vomited gastric contents to completely bypass the pharynx when the drain tube is correctly positioned to vent the esophagus. Whether this feature allows the PLMA to meet or even exceed the degree of protection from aspiration provided by cuffed ETT remains to be determined. As with any airway device, appropriate patient selection remains essential.

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