Gastric Insufflation with the ProSeal Laryngeal Mask

Joseph Brimacombe, MB, ChB, FRCA*, Christian Keller, MD†, and Alison Berry, MB, ChB, FRCA‡

*Department of Anaesthesia and Intensive Care, Cairns Base Hospital, Cairns, Australia; †Department of Anaesthesia and Intensive Care Medicine, Leopold-Franzens University, Innsbruck, Austria; and ‡Department of Anaesthesia, John Flynn Hospital, Tugun, Australia

The ProSeal laryngeal mask airway (PLMA) (Laryngeal Mask Company, Henley-on-Thames, UK) is a new airway device with a large double cuff that forms a better seal than the standard laryngeal mask airway; it also has a drainage tube designed to protect against regurgitation, facilitate passage of a gastric tube, reduce the risk of gastric insufflation, and facilitate the detection of malposition (1). The test for malposition involves placing a small volume of a water-based lubricating jelly in the proximal end of the drainage tube, applying positive pressure to the airway tube, and observing the meniscus of the jelly to determine whether there is an air leak up the drainage tube. The presence of an air leak suggests that the distal end of the drainage tube and the airway tube are not isolated and that the PLMA is malpositioned. We describe a patient undergoing laparoscopic cholecystectomy who developed gastric insufflation despite a negative malposition test and make recommendations for improving the reliability of the test for malposition.

Case Report

A 56-yr-old woman (ASA grade II, weight 65 kg, height 162 cm) was scheduled for elective laparoscopic cholecystectomy. She had a medical history of asthma treated with regular salbutamol and had been on steroids for the past 6 mo. Physical examination revealed a normal airway and a clear chest. The anesthesia management plan included use of the PLMA to minimize the risk of triggering bronchospasm. Anesthesia was induced with fentanyl 100 μg and propofol 150 mg, and maintenance was with sevoflurane 1%–2% in nitrous oxide and 33% oxygen. Muscle relaxation was provided by IV vecuronium 5 mg. A size 4 PLMA was inserted without the introducer tool by using the technique described by the inventor. Some resistance was felt at the back of the mouth as the device passed into the pharynx, but placement was considered to be adequate. The cuff was inflated with 20 mL of air, and the lungs were easily inflated. The proximal end of the drainage tube was filled with a water-based lubricating jelly and the expiratory valve closed. Oropharyngeal leak pressure was 34 cm H2O, and no air leakage was detected up the drainage tube. Positive-pressure ventilation was commenced with a tidal volume of 600 mL. The respiratory rate, inspiratory/expiratory ratio, and inspiratory flow rate were 12 breaths/min, 1:1.5, and 30 L/min, respectively. Peak airway pressures were 17 cm H2O before the start of surgery. Auscultation of the lungs revealed good air entry with no bronchospasm. Auscultation of the epigastrium revealed no gastric insufflation. Peak airway pressures increased to 28 cm H2O during carboperitoneum.

Twenty minutes after the start of surgery, the surgeon noticed that the stomach was inflating and asked for a gastric tube to be inserted. Epigastric auscultation confirmed that air was passing into the stomach during each positive-pressure breath. A well lubricated 16F gastric tube was inserted into the drainage tube but would not pass out of the drainage tube into the stomach. Fiberoptic inspection through the drainage tube revealed that it was occluded in the middle of the mask. Fiberoptic inspection through the airway tube through a self-sealing connector revealed that the distal mask was folded underneath the proximal mask. The upper esophageal sphincter was also seen to open during each positive-pressure breath. Subtraction of the expired from the inspired tidal volume revealed that approximately 30 mL of air was passing into the stomach with each breath. The PLMA was withdrawn into the mouth and reinserted with a lateral approach. On this occasion, no tactile resistance was felt at the back of the mouth. Further fiberoptic inspection revealed a correctly placed and patent drainage tube. The 16F gastric tube was easily inserted, and the stomach was seen to deflate laparoscopically. The remainder of the anesthetic and postoperative course was uneventful.

Discussion

Brain et al. (1) describe two malpositions for the PLMA. The first is when the PLMA is not inserted deeply enough, resulting in the tip’s sitting in the midpharynx. This results in air leakage up the drainage tube during positive-pressure ventilation and a poor seal. The second is when the PLMA tip hits the glottis. This results in airway obstruction and air leakage up the drainage tube. Our case reveals a third malposition, in which the tip of the PLMA cuff is folded posteriorly (Figs. 1 and 2). This results in failure

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Address correspondence and reprint requests to Dr. Brimacombe, Department of Anaesthesia and Intensive Care, Cairns Base Hospital, The Esplanade, Cairns 4870, Australia.
of the drainage tube to perform its intended functions, but it may have no effect on seal or ventilatory function. A similar folding-over malposition has been observed with the laryngeal mask airway radiologically and was associated with an adequate airway (2). We consider this malposition more likely to occur with the PLMA; the PLMA cuff is softer than the laryngeal mask airway cuff because it does not contain a semi-rigid backplate.

The sensitivity of the malposition test has not been formally tested, but in our combined experience of more than 1500 uses it has been successful at predicting the malpositions described by Brain et al. (1). The danger of the malposition we have described is that the standard test for malposition test will not detect it. This may indirectly put the patient at increased risk of gastric insufflation and aspiration by giving the anaesthesiologist a false sense of security. A simple, noninvasive method to exclude this malposition would be to pass a gastric tube down to the end of the PLMA tip to verify that the drainage tube is patent. Alternatively, this could be confirmed with a fiberoptic scope. We recommend that this drainage tube test be performed if there is any tactile resistance to placement.

We conclude that gastric insufflation is possible with the PLMA, despite a good seal and a negative malposition test, if the cuff of the PLMA is folded over posteriorly. This malposition can be excluded by testing drainage tube patency with a gastric tube or fiberoptic scope. We recommend that this drainage tube test be performed if there is tactile resistance to placement.

References