Aspiration of Gastric Contents During Use of a ProSeal™ Laryngeal Mask Airway Secondary to Unidentified Foldover Malposition

Joseph Brimacombe, MB, ChB, FRCA, MD*, and Christian Keller, MD†
*Department of Anaesthesia and Intensive Care, James Cook University, Cairns Base Hospital, Australia; and †Department of Anaesthesia and Intensive Care Medicine, Leopold-Franzens University, Innsbruck, Austria

The primary function of the drain tube of the ProSeal™ laryngeal mask airway (PLMA) is to prevent aspiration of regurgitated stomach contents. We report a case of gastric aspiration with the PLMA during a laparoscopic cholecystectomy in a 64-yr-old healthy man secondary to an unidentified foldover malposition. It is imperative that the position and patency of the drain tube be verified in all patients with the PLMA.

Case Report

A 64-yr-old healthy man with a body mass index of 29 kg/m² presented for a laparoscopic cholecystectomy. He had no medical history and on examination was Mallampati Grade 2. The anesthesiologist decided to use the PLMA for the procedure on the basis of the favorable results of a recent study (9) and a moderate amount of experience (all favorable) with the PLMA in minor cases. Anesthesia was induced with IV alfentanil and propofol. Anesthesia was maintained with an oxygen/N₂O/sevoflurane mixture. No muscle relaxant was given. Insertion of the Size 5 PLMA was slightly difficult with the digital technique because of resistance at the back of the mouth, but insertion into the pharynx was successful at the second attempt. The cuff was inflated with 20 mL of air, and tidal volumes of 1000 mL were easily achieved with airway pressures of 25 cm H₂O.

The PLMA was fixed according to the manufacturer’s instructions (10). The anesthesiologist noted that the bite block was mostly protruding from the mouth, but there was no air leak from the drain tube. No attempt was made to pass a gastric tube. The patient underwent volume-controlled positive-pressure ventilation with tidal volumes of 650 mL, airway pressures of 27 cm H₂O, and an end-tidal CO₂ of 43 mm Hg during peritoneal insufflation. In the middle of the procedure, however, the patient suddenly started coughing, and bile-stained fluid was seen in the airway tube. The surgeon was asked to release the gas from the abdomen, 100% oxygen was given, anesthesia was deepened, head-down tilt was applied, and a muscle relaxant was administered. A suction catheter was passed into the airway tube, and approximately 50 mL of bile-stained fluid was removed. Ventilation was easy, and gas exchange was unaffected. An attempt to pass a gastric tube failed because of resistance within the drain tube. Passage of a fiberoptic scope down the airway tube revealed a small volume of bile-stained fluid within the trachea and showed that the distal cuff was not in the hypopharynx. Passage of the fiberoptic scope down the drain tube showed that it was folded over in the mid portion of the bowl. The PLMA was removed, and the trachea was easily intubated. The procedure was completed uneventfully. There were no postoperative complications.

Discussion

On the basis of the adequacy of the seal, ease of ventilation, and lack of air leak from the drain tube, the anesthesiologist, who had received no training from an experienced PLMA user, assumed that the PLMA was correctly positioned when in fact the distal cuff was folded over. The foldover malposition was first reported by our group in association with gastric
insufflation (11) and has an incidence of approximately 3% when the PLMA is inserted by using the digital or introducer-tool techniques (12), but it cannot occur with the bougie-guided insertion technique (13). The foldover malposition occurs when the distal cuff impacts against the posterior oropharyngeal wall during insertion. Starting with the distal rim, the cuff folds underneath until the unfolded portion is redirected inferiorly into the laryngopharynx (11). The foldover malposition has been reported with the Classic laryngeal mask airway (14) but is probably more common with the PLMA because the backplate is softer. A recent report (12) showed that of 95 patients with the foldover malposition, resistance was encountered at the back of the mouth in 92%, the bite block protruded from the mouth in 83%, and ventilation was unaffected and the seal was normal in 98%, a pattern of findings similar to those in this case.

The foldover malposition is particularly dangerous because the PLMA cannot prevent aspiration or gastric insufflation, yet high airway pressure ventilation is still possible, increasing the risk that these problems will occur. Also, the lack of air leak up the drain tube can dupe the clinician into assuming that the PLMA is correctly positioned. It is therefore imperative that the foldover malposition be excluded in all patients. Clues that the foldover malposition may have occurred are that resistance is encountered during insertion and that the bite block is mostly protruding from the mouth. Failure to pass the gastric tube because of resistance in the distal portion of the drain tube confirms the diagnosis. Passage of a fiberoptic scope down the drain tube will also confirm the diagnosis, as in this case, but this is unnecessary.

It is useful to be aware of the length of the drain tube so that the location of any resistance can be determined (Size 2, 19.5 cm; Size 3, 26.5 cm; Size 4, 27.5 cm; Size 5, 28.5 cm). When passage of a gastric tube is not required, the patency of the drain tube can be tested by noninvasively passing the gastric tube only to the end of the drain tube. The suprasternal notch tap test of O’Connor et al. (15) will also provide information about the position and patency of the drain tube, but it may not be completely reliable at detecting the foldover malposition, because false positives can occur if only the last 1–2 cm of the drain tube is folded over (16). Certainly, a negative tap test strongly suggests malposition of the distal cuff.

Several techniques have been used to correct the foldover malposition, including 1) reinsertion by using a lateral approach, 2) reinsertion with the drain tube stiffened with a stylet, 3) guided insertion with a gum elastic bougie, and 4) digital correction by sweeping a finger behind the cuff. Of these, we have found that 1 and 3 are the most effective.

There are insufficient published data to determine the safety of the PLMA used in laparoscopic cholecystectomy, but there is one study showing that it is effective and superior to the Classic laryngeal mask airway (9). One of the authors (JB) has used the PLMA in 289 patients for elective intraabdominal surgery without any adverse events other than 1 episode of gastric insufflation (11) and 1 episode of regurgitation without aspiration (3). In our view, the PLMA is probably safe for elective intraabdominal surgery provided that it is correctly positioned.

We conclude that aspiration of stomach contents can occur with the PLMA if it is malpositioned. It is imperative that the position and patency of the drain tube be verified in all patients with the PLMA.

References

IARS Future Meetings

IARS 78th Congress — March 27–31, 2004, Tampa, Florida
IARS 79th Congress — March 11–15, 2005, Honolulu, Hawaii
IARS 80th Congress — March 24–28, 2006, San Francisco, California