

Case Report

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# The ProSeal™ LMA Offers Protection against Regurgitation in Emergency Abdominal Laparoscopic Surgery

Joaquin Fabregat-López<sup>1\*</sup> and Natalia Navarro García<sup>2</sup>

<sup>1</sup>Specialist of Anesthesiology and Reanimation, Department of Anesthesia and Perioperative Care, University Hospital Rosell Cartagena, Murcia, Spain

<sup>2</sup>Resident of Anesthesiology and Reanimation, Department of Anesthesia and Perioperative Care, University Hospital Rosell Cartagena, Murcia, Spain

## Abstract

This case details the successful use of a ProSeal™ Laryngeal Mask Airway (PLMA) in managing a patient presented for laparoscopy emergency abdominal surgery via. A 42-yr-old, ASA physical status II male patient with suspected perforation of a peptic ulcer presented as an emergency abdominal surgery. The PLMA enabled rapid establishment of a clear airway early in anaesthetic induction, controlled ventilation and safe airway maintenance undergoing surgery.

**Keywords:** Airway; Proseal; Emergency; Regurgitation

## Introduction

Pulmonary aspiration of gastric contents during general anesthesia is a rare event during elective surgery while the incidence increases in emergency surgery [1]. We describe the use of the ProSeal Laryngeal Mask airway (PLMA™, Laryngeal Mask Company, Henley-on-Thames, UK) in a patient presenting for emergency abdominal surgery, without the occurrence of aspiration. This report is interesting in the possibility that a PLMA can be used safely in conditions that are traditionally deemed to carry high risk for regurgitation and pulmonary aspiration. Written consent for publication of the manuscript and the patient image was granted by the patient.

## Case Report

A 42-yr-old, ASA physical status II male patient with suspected perforation of a peptic ulcer presented for emergency abdominal laparoscopic surgery. He was 175 cm tall and weighed 70 kg (body mass index 23 kg•m<sup>-2</sup>). He was starved for 6 hours prior to surgery. Airway assessment showed a Mallampati class II. Prior to the induction of anesthesia a nasogastric tube was in place.

Following pre-oxygenation the patient was induced in a titrated fashion with midazolam 2 mg iv, fentanyl 75 µg iv, propofol 160 mg iv, and rocuronium 50 mg iv. A lubricated size 5 PLMA was inserted using a digital technique by an experienced anesthesiologist on the first attempt with cricoid pressure maintained: the PLMA was inserted as far as possible, cricoid pressure was then released, the PLMA further advanced and inflated to a cuff pressure of 60 cmH<sub>2</sub>O. Ventilation adequacy and anatomic position were confirmed using measures previously described for PLMA assessment [2]. The PLMA enabled ventilation of the lungs to normocapnia without a leak. Airway leak pressure was 32 (cmH<sub>2</sub>O). A gastric tube was passed via the PLMA drain tube as a guide to reinsertion if the PLMA is displaced and approximately 40 ml of bile-stained fluid was drained from the stomach. Inability to pass a gastric tube indicates mask misplacement. Anaesthesia was maintained with a target controlled infusion of intravenous propofol (TCI) and remifentanyl infusion of 0.1–0.3 µg/kg/min. Additional boluses of rocuronium 0.1–0.15 mg/kg were given as required. The lungs were ventilated using oxygen and air by volume-controlled ventilation (VCV) without difficulty (respiratory rate 12 breaths/min, inspiratory: expiratory ratio 1:1, PEEP: 4 cmH<sub>2</sub>O, end-tidal CO<sub>2</sub> 35 mmHg, no airway leak on spirometry).

The surgeon inserted a trochar into the peritoneal cavity under

direct vision to perform the laparoscopy. Peritoneal insufflation pressure was preset and maintained at 15 mmHg. Head up and lateral tilts were provided at the surgeon's request. Surgery lasted 60 minutes during which the surgeon inspected the stomach laparoscopically, diagnosis of duodenal perforation was confirmed and the defect was sutured. The peritoneal insufflation led an increase peak inspiratory pressure from 17 cmH<sub>2</sub>O to 22 cmH<sub>2</sub>O, without deterioration in tidal volume. The surgeon required the introduction of 300 ml of methylene blue through the nasogastric tube to check the integrity of the intestinal closure, [Figure 1](#). 200 mL of methylene blue liquid was suctioned



**Figure 1:** The image shows the introduction of methylene blue through the nasogastric tube to check the integrity of the intestinal closure during the laparoscopic surgery. Image showing the insertion of size n°: 5 PLMA™.

**\*Corresponding author:** Joaquin Fabregat Lopez, Specialist of Anesthesiology and Reanimation, Department of Anesthesia and Perioperative Care, University Hospital Rosell Cartagena, Murcia, Spain, Fax: 968 128619; E-mail: [kinoyo@hotmail.com](mailto:kinoyo@hotmail.com)

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through the gastric tube before the end of surgery. The PLMA was in place throughout surgery: at the time of removal no methylene blue was seen on the inside of the bowl, and the inspection of the surface of the PLMA revealed no evidence of bile stained fluid. The patient's recovery was uneventful.

## Discussion

Our use of the PLMA for emergency abdominal surgery is likely to be controversial, as it is probably more usual to use tracheal intubation (TT) as part of a 'rapid sequence induction'. Some will criticise our management of this case, particularly the decision to proceed with general anesthesia with a PLMA when there is the risk of regurgitation due to a potentially full stomach. The limits of performance and security of the PLMA in this scenario remain undefined. Cadaver and clinical studies have confirmed that when the drainage tube is correctly positioned, the PLMA provides protection from fluid regurgitation [3,4]. Notably, PLMA design and function minimizes the likelihood of regurgitation and aspiration, and extensive evidence supports this [2]. The PLMA equipped with a second posterior cuff and a drain tube, is designed to offer better "pharyngeal seal" enabling controlled ventilation and decrease gastric inflation (which lessens the likelihood of subsequent regurgitation). The combination of improved sealing and the presence of a drain tube improves efficacy and creates functional separation of the gastrointestinal tract from the respiratory tract [2]. This is likely to improve safety (though this is very hard to prove). The evidence basis of expert opinion and experience is defined as category IV evidence, the lowest quality (grade D) recommendations [5]. Recent publications have suggested use of PLMA should become a "standard of care" [5].

The most important finding in this case report is that the PLMA was used safely throughout surgery. Specifically, there were no problems with oxygenation, ventilation or important changes in respiratory mechanics during surgery. The use of the PLMA for emergency abdominal laparoscopic procedures is an advanced use of the device, provides the most severe test for efficacy of supraglottic airway device (SAD) [6]. If position and performance are optimal, we suggest that there is no logical reason to change to a TT. The anesthesiologist's prior experience with these devices and constant monitoring of airway quality are vital in such cases. Therefore the PLMA "should not be regarded as absolutely safe where there is an increased risk of regurgitation or aspiration" [2]. It is important to consider the fact that our anesthetic technique should not be conditioned by the increased intra-abdominal pressure. Distension of the abdomen by gas insufflations does not increase the risk of regurgitation unless the patient has an incompetent lower oesophageal sphincter [7]. The lower esophageal sphincter (LES) and the upper esophageal sphincter (UES) play a central role in preventing regurgitation and aspiration. The physiological function of the LES, is to protect the airway from aspiration of gastric contents, is the extreme importance to anaesthesiologists. According De Leon et al. [8] during insufflation of the abdominal cavity up to 12 to 13 mmHg, the lower esophageal sphincter (LES) pressure increased, probably in a similar way as during the Valsalva maneuver or coughing in non anesthetized patients. This may reflect the indirect action of increased abdominal pressure caused by insufflation outside the LES that compresses the sphincter and thereby contributes to preventing aspiration or regurgitation. There are no published data to assess whether the PLMA reduces the risk of regurgitation in this scenario. The PLMA can provide improved protection against aspiration. The aim of our report is to consider the role of the PLMA as an alternative

to the tracheal intubation. Recently, we published a series of 102 patients who presented for emergency appendectomies in a one-year period (2007) and were managed with a PLMA (12 laparoscopic appendectomy) [9]. In our study, all patients were managed effectively and safely throughout surgery, and, while we acknowledge readily that such all study cannot confirm safety, the absence of complications is notable. The description of the tracheal tube as airway gold standard is based on supposition rather than experimentation and progress in SAD technology challenges this. Intubation has inherent risks and we believe unnecessary intubation should be avoided where appropriate alternatives exist [10]. While aspiration around a cuffed tracheal tube is rare perhaps manipulations of the tracheal tube may cause aspiration [11].

We are encouraged to consider the "randomised clinical trial" (RCT) as the gold standard of evidence. But the RCT is far from the sole source of all our evidence and several other approaches are as valid or as persuasive. Therefore, we should regard all of the "tools"; perhaps a "simple case report" answers our questions of interest like search of evidence in medicine [12,13].

## Conclusions

This report describes the successful of a PLMA in a patient presenting for emergency abdominal surgery. This case reinforces the need for alternative techniques to be available for establishing airway patency. In most circumstances, the airway of choice for an emergency is likely to be the tracheal tube. However, PLMA is a useful alternative to protect against of aspiration.

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