

The ProSeal™ LMA is a useful rescue device during failed rapid sequence intubation: two additional cases

[Le ML ProSeal™ est un instrument de secours utile pour l'intubation pendant une induction à séquence rapide : deux nouveaux cas]

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Purpose: We report two cases where the ProSeal™ laryngeal mask airway (PLMA) was successfully used as a rescue device, after failed tracheal intubation, during rapid sequence induction.

Clinical findings: The first case involved a 31-yr-old primigravida presenting for emergency Cesarean section for severe fetal distress. She had a grade 3 larynx and airway edema was observed during laryngoscopy. Attempts with a McCoy blade and gum elastic bougie failed to secure the airway. A size 4 PLMA was inserted with good airway control and surgery proceeded uneventfully. The second case involved a 51-yr-old man presenting for appendectomy. Following failed attempts at intubation, a size 5 PLMA was successful in securing his airway and surgery proceeded uneventfully.

Conclusions: The correctly placed PLMA has potential advantages over the cLMA for airway rescue in the circumstance of failed emergency intubation in a patient with a potentially full stomach. In the two cases reported, the PLMA provided effective rescue of the airway.

Objectif : Présenter deux cas où le masque laryngé ProSeal™ (MLP) a servi d'instrument de secours après l'échec de l'intubation endotrachéale pendant une induction à séquence rapide.

Éléments cliniques : Dans le premier cas, une primigeste de 31 ans est admise pour une césarienne d'urgence en raison d'une détresse fœtale sévère. L'examen laryngoscopique révèle un larynx de grade 3 et un œdème des voies aériennes. Les tentatives d'intubation échouent avec la lame McCoy et une bougie d'intubation. Un MLP de taille 4 est inséré et permet un contrôle adéquat des voies aériennes et le bon déroulement de l'intervention chirurgicale. Le second cas implique un homme de 51 ans opéré pour une appendicectomie.

Après l'échec de l'intubation, l'insertion réussie d'un MLP de taille 5 assure la protection des voies aériennes et une opération sans incident.

Conclusion : La bonne mise en place du MLP présente des avantages potentiels sur le ML classique pour protéger les voies aériennes en cas d'échec d'une intubation d'urgence chez un patient qui pourrait avoir l'estomac plein. Dans les deux cas présentés, le MLP a permis de rétablir efficacement la perméabilité des voies aériennes.

THE ProSeal™ laryngeal mask airway (PLMA; Intavent Orthofix, Maidenhead, UK) is a supraglottic device introduced in 2000.¹ It is designed to facilitate controlled ventilation and enable separation of the respiratory and gastrointestinal tracts.¹ These features (and the ability to drain the stomach through its drain tube) make it potentially useful as a rescue airway after failed tracheal intubation. Its use after failed rapid sequence induction (RSI) has been suggested² and successful airway management has been reported in both obstetric³ and non-obstetric RSI.⁴ We report two additional cases where the PLMA proved effective in rescuing the airway after failed tracheal intubation during RSI.

Clinical features

Case #1

A 31-yr-old primigravida presented for emergency lower segment Cesarean section for severe fetal dis-

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tress. She weighed 90 kg and was 152 cm tall (body mass index 39 kg·m⁻²). Airway assessment showed a Mallampati class III view^{5,6} and possible difficulty in tracheal intubation was predicted. Following pre-oxygenation and RSI with cricoid pressure (single-handed from the patient's right, with a force of approximately 30N), laryngoscopy revealed a grade 3 view⁷ with airway edema. A McCoy blade did not improve the laryngeal view. One attempt at blind passage of a gum elastic bougie failed. Oxygen saturation fell to 89% but rose with manual ventilation. Cricoid pressure was briefly released and a size 4 PLMA was inserted by the anesthesiologist (who had used the PLMA eight times before) with good airway control. A gastric tube was passed via the drain tube and approximately 20 mL of bile-stained fluid drained. Surgery was completed with the PLMA in place. Recovery of the patient was uneventful.

Case #2

A 51-yr-old man presented for emergency appendectomy. He weighed 80 kg and was 152 cm tall (body mass index 35 kg·m⁻²). He was a brittle asthmatic requiring prednisolone 25 mg daily to control his asthma. He had a beard, a full set of teeth, a short neck and his airway was classified Mallampati class III.^{5,6} A possible difficult laryngoscopy was predicted. Following pre-oxygenation and RSI with cricoid pressure applied (single-handed from the patient's right with a force of approximately 30N) laryngoscopic view was grade 3,⁷ and was not improved by airway manipulation or use of a McCoy blade. After two failed attempts to intubate, a classic laryngeal mask (cLMA; Intavent Orthofix, Maidenhead, UK) was inserted, but controlled ventilation of the lungs was not possible due to airway leak and oxygen saturation fell. It was decided to wake the patient and perform awake fiberoptic intubation. However emergence was complicated by severe laryngospasm and further oxygen desaturation, which required additional muscle relaxation. An attempt to pass a 6-mm cuffed tracheal tube through the cLMA into the trachea failed. A size 5 PLMA was inserted (by an anesthesiologist with 20 prior uses). A gastric tube was passed and minimal gastric aspirate appeared. The PLMA enabled ventilation of the lungs to normocapnia without a leak. In view of the potential difficulties of further anesthetic interventions in this patient with reactive airways disease, a decision was made to continue with surgery which proceeded without complication. The patient's recovery was uneventful.

Discussion

In the case scenario of failed RSI with difficult airway maintenance or difficult ventilation, an airway must be secured rapidly or life-threatening hypoxia is inevitable.^{8,9} The cLMA is recommended as an airway rescue device during failed tracheal intubation in North American guidelines.^{10,11} The PLMA does not currently appear in the ASA or Canadian guidelines^{11,12} but has recently been included in the management options in the algorithm for failed intubation during RSI by the United Kingdom Difficult Airway Society.¹³

When rescuing the airway after failed RSI, controlled ventilation of the lungs will be required and intragastric volume is likely to be increased. The physiomy of a patient in whom tracheal intubation and mask ventilation have failed may make lung ventilation difficult. Langeron reported a marked increase in the incidence of difficult mask ventilation in patients who were impossible to intubate compared to those who were not.¹⁴ The use of the cLMA during controlled ventilation is controversial and the airway seal is below 20 cm H₂O in 50% of cases.¹⁵ In addition, the risk of gastric inflation increases as airway pressure rises¹⁶ and the cLMA is generally regarded as offering no protection against aspiration of regurgitated stomach contents.¹⁷ All these factors make it an imperfect rescue device.

The PLMA has potential advantages over the cLMA in these circumstances. It is designed specifically for use during controlled ventilation. Correctly placed, it enables functional separation of the gastrointestinal and respiratory tracts¹ and provides a greater than 50% better airway seal than the cLMA.^{1,15,18,19} The drain tube assists in confirmation of correct placement,¹ reduces the likelihood of gastric inflation, enables drainage of the stomach and provides an 'escape route' if regurgitation should occur.¹ These potential advantages must be balanced against potential disadvantages of the PLMA. Most studies report that the PLMA takes longer to insert than a cLMA and that first time insertion rates are lower (84% PLMA *vs* 91% cLMA).^{15,18,19} However, clinicians who have more experience with cLMA insertion generally performed these studies. A recent study of nurses naive to insertion of all laryngeal masks reported equivalent insertion performance with the cLMA and PLMA.²⁰ Partial airway obstruction may occur when using the PLMA²¹ but is rarely reported outside this one study, and has not been reported in randomized controlled trials. The incidence of obstruction with the cLMA and PLMA is not known. In failed intubation where there is minimal risk of aspiration, the cLMA should probably be the first choice rescue device. However where RSI is undertaken, a high risk

of aspiration might be assumed and there is a stronger argument for considering use of the PLMA.

Finally, the PLMA is not a substitute for a tracheal tube and increased protection of the airway occurs only when it is correctly positioned. Pulmonary aspiration has been reported during use of a PLMA which was considered to be placed correctly.²² Further work is needed to determine the extent to which the PLMA protects the airway in the broader clinical setting.

In both cases reported here, cricoid pressure was briefly released to enable passage of the PLMA. The need for cricoid pressure release has not been studied, but both the cLMA and intubating laryngeal mask require reduction or release of cricoid pressure to enable correct placement.^{23,24} The design of the PLMA, which has a bulkier leading edge than other laryngeal masks, makes the release of cricoid pressure during insertion prudent. When ventilation is difficult and the patient is hypoxic, maintenance of cricoid pressure is a lower priority than prompt establishment of a patent airway and re-oxygenation.

In both cases described, we used either a digital insertion technique or the introducer tool supplied with the PLMA. Recently Brimacombe has reported that the most reliable technique for insertion of the PLMA involves insertion of a gum elastic bougie in the oesophagus and guiding the PLMA over the bougie via the drain tube. In two studies this technique resulted in 100% first-time insertion and the technique intrinsically eliminates the possibility of the PLMA tip folding over.^{25,26} This insertion technique should be considered in circumstances where accurate first time insertion is essential.

In is notable that four cases (two reported here and two elsewhere)^{3,4} occurred in one hospital over a period of a little over one year. The cases were managed by several trainee anesthesiologists. The PLMA is a routine tool for elective cases in our hospital and its use is taught to all trainees. The PLMA has been part of our difficult intubation cart for over one year. It is likely that theoretical knowledge and practical familiarity with the PLMA meant that trainees were confident in using the PLMA during these cases.

Our management of these cases might be criticized. In particular the decision to proceed with general anesthesia when the possibility of difficult laryngoscopy was predicted is open to debate. However a class III Mallampati view has been reported to have a positive predictive value of difficult intubation as low as 2%²⁷ and UK and Canadian management of these cases might differ. Importantly, the aim of our report is to consider the role of the PLMA as a rescue device after failed RSI rather than to discuss the relative mer-

its of RSI or awake fibreoptic intubation. Similarly, opinions may differ as to the appropriateness of continuing with surgery once the airway was established.

On the basis of the available evidence, we believe the PLMA has advantages over the cLMA in the circumstance of failed emergency intubation in a patient with a potentially full stomach. We believe the PLMA should be considered in these circumstances, especially by those experienced in its use.

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