Failed Obstetric Tracheal Intubation and Postoperative Respiratory Support with the ProSeal™ Laryngeal Mask Airway

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The ProSeal™ laryngeal mask airway (ProSeal™ LMA) provides a better seal and probably better airway protection than the classic laryngeal mask airway (classic LMA). We report the use of the ProSeal™ LMA in a 26-yr-old female with HELLP syndrome for failed obstetric intubation and postoperative respiratory support. Both laryngoscope-guided tracheal intubation and face mask ventilation failed, but a size 4 ProSeal™ LMA was easily inserted and high tidal volumes obtained. A gastric tube was inserted through the ProSeal™ LMA drain tube and 300 mL of clear fluid was removed from the stomach. There were no hemodynamic changes during ProSeal™ LMA insertion. Postoperatively, the patient was transferred to the intensive care unit, where she was ventilated via the ProSeal™ LMA for 8 h until the platelet count had increased and she was hemodynamically stable. Weaning and ProSeal™ LMA removal were uneventful. There is anecdotal evidence supporting the use of the LMA devices for failed obstetric intubation (19 cases) and for postoperative respiratory support (8 cases). In principle, the ProSeal™ LMA may offer some advantages over the classic LMA in both these situations.

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The use of the laryngeal mask airway (LMA) for the difficult obstetric airway (1–18) and postoperative respiratory support (19–25) has been widely reported; however, the LMA is not ideal for either of these tasks because high airway pressure ventilation may be required and patients are frequently at risk of aspiration. The ProSeal™ LMA is a new laryngeal mask device that provides a better seal (26–28) and probably better protection against aspiration (29). We report the use of the ProSeal™ LMA for airway rescue and postoperative respiratory support for a period of 8 h in a patient with HELLP syndrome. We also review the literature regarding use of LMA devices in these situations.

Case Report

A 26-yr-old female (height 165 cm, weight 100 kg) with intrauterine growth retardation and HELLP syndrome presented at 30 wk gestation for an urgent cesarean delivery because of fetal bradycardia. She had been admitted to the hospital 3 days previously with a diagnosis of severe preeclampsia and had subsequently developed impaired liver function and a rapidly decreasing platelet count (133,000/mm^3 to 80,000/mm^3 in 2 h). On examination she had face, tongue, and lip edema and was a Mallampati Class IV airway. Despite a complete explanation of the possible risks, she insisted on general anesthesia. Sodium citrate was administered. She was administered oxygen for 5 min and a rapid sequence induction was performed with thiopental 500 mg (dose required to achieve loss of consciousness), succinylcholine 120 mg, and cricoid pressure (CP). A surgeon was available to perform a tracheostomy, if required. Anesthesia was administered by two experienced anesthesiologists with considerable experience of laryngoscope-guided tracheal intubation, face mask ventilation, and use of the LMA. The airway management plan was to allow two brief, optimal attempts at laryngoscope-guided tracheal intubation (the first attempt with CP and the second without CP) and to use the ProSeal™ LMA (without CP) for airway rescue if face mask ventilation failed (without CP). Subsequently, laryngoscope-guided tracheal intubation failed (as the glottis could not be seen) and two-man face mask ventilation with a Guedel airway failed (as a clear airway could not be obtained), but a size 4 ProSeal™ LMA was easily inserted at the first attempt and the cuff inflated

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Table 1. Laryngeal Mask Airway as a Ventilatory Device and Airway Intubator in the Difficult Obstetric Airway

Authors	VD	AI‡	CP	Notes
Case reports				
McClune et al (1)	1		Yes	Procedure completed with LMA plus CP
De Mello & Kocan (2)†	1		Yes	Procedure completed with LMA plus CP
Storey (3)*§	1		Yes	Procedure completed with LMA plus CP
Christian (4)*	1		Yes	Not improved by release of CP.
Chadwick & Vohra (5)	1		Yes	Procedure completed with LMA plus CP
Lim & Wareham (6)†	1		Yes	Procedure completed with LMA plus CP
Priscu et al (7)†	1		Yes	Procedure completed with LMA plus CP
Hasham et al (8)	1	1	Yes	Intubation via LMA after delivery of fetus
McFarlane (9)	1		Yes	Awakened for spinal
Vanner (10)*	1		Yes	Failed as VD with CP.
Brimacombe (11)	1		Yes	Awakened for spinal 1 hr later
De Mello & Kocan (12)†	1		Yes	Procedure completed with LMA plus CP
De Mello & Restall (14)	2		Yes	Procedure completed with LMA plus CP
Davies et al (15)†	2		Yes	Procedure completed with LMA plus CP
Godley & Ramachandra (13)		1	No	Awake insertion and intubation
Shung et al (16) (ILMA)		3	No	Awake insertion and intubation
Current (PLMA)	1		No	Procedure completed with PLMA without CP
Surveys				
Hawthorne et al (17)*	4			Failed as VD in 1 patient with laryngeal edema.
Gatuare & Hughes (18)*	24	3		Failed as VD in 3. Failed as AI in 3.

CP = cricoid pressure; VD = ventilatory device; AI = airway intubator; ILMA = Intubating LMA; PLMA = ProSeal™ LMA.
* Failed use; † insertion in lateral position; ‡ all blind intubations; § initial failure with CP applied. Subsequently inserted successfully without CP which was then reapplied and ventilation was still successful

with 20 mL air. Tidal volumes in excess of 1000 mL were immediately obtained with peak airway pressures of 25 cm H_2O. The minimal Spo_2 was 93%. Her arterial blood pressure was stable during laryngoscopy and ProSeal™ LMA insertion. Anesthesia was subsequently maintained with O_2 and end-tidal isoflurane 0.8%. A gastric tube was inserted via the drain tube and 300 mL of clear fluid was removed from the stomach. An 1800-g male with low Apgar scores (3 at 1 min, 5 at 5 min) was delivered 5 min after ProSeal LMA insertion and transferred to the neonatal intensive care unit for respiratory support. After surgery was complete, a decision was made to ventilate the patient until the platelet count had increased (in case further surgery was required for bleeding) and she was hemodynamically stable (to reduce the risk of acute hypertension during emergence). No attempt was made to exchange the ProSeal™ LMA for a tracheal tube, as ventilation was adequate and the airway probably protected. Also, there was a risk that further attempts at intubation, even fiberoptically, would fail or cause airway trauma. The patient was transferred to the intensive care unit, where she was sedated with propofol and underwent pressure-controlled ventilation via the ProSeal™ LMA for 8 h. Weaning and ProSeal™ LMA removal took 30 min and were uneventful. There was no evidence of aspiration, as determined by normal lung function, a clear chest radiograph, and a lack of bile-stained fluid in the bowl of the ProSeal™ LMA. Both the neonate and mother made a full recovery and there were no other sequelae.

Discussion

Our case is the 19th describing LMA use in the difficult obstetric airway (Table 1). Most previous cases have involved the classic LMA (1–3,5–15,17,18), but one involved the Intubating LMA (16). Analysis of these reports reveals that the LMA was used as a ventilatory device in 44 patients, including 4 as an airway intubator and 4 as an aid to awake intubation, with success rates of 84% (37 of 44), 25% (1 of 4), and 100% (4 of 4) respectively. These reports also show that the LMA was successfully inserted with CP applied in 81% (13 of 16) of patients, and in the lateral position in 100% (6 of 6). There were no episodes of regurgitation or aspiration or hypoxic brain injury. In this case, we inserted the ProSeal™ LMA without CP because the distal cuff must be perfectly positioned in the hypopharynx, which lies immediately behind the cricoid cartilage, to provide protection against regurgitation and gastric insufflation (30). The lack of success as an aid to blind intubation suggests that this technique should not be attempted with the classic LMA; however, this may be a more reasonable option with the intubating LMA, as success is more frequent (31). Han et al. (32) reported the successful use of the classic LMA as a ventilatory device in 1060 of 1067 patients for elective cesarean delivery (32).

The ProSeal™ LMA offers several advantages over the classic LMA for failed obstetric intubation. First, the seal is 10 cm H_2O higher giving it greater ventilatory capability (28). Second, it may protect against aspiration when correctly positioned, as evidenced by cadaver (29) and laboratory (33) studies demonstrating isolation of the respiratory tract from the gastrointestinal tract. Third, a gastric tube can be easily inserted to empty the stomach of fluid and air insufflated during difficult face

Table 2. Laryngeal Mask Airway for Postoperative Respiratory Support

Authors	Duration (min)	Surgery	Notes
White et al. (19)	120	Cardiac	67-yr-old with a difficult airway.
Fullekrug et al. (20)	45	Perforated peptic ulcer	90-yr-old patient with respiratory failure because of atelectasis.
Groudine et al. (21)	90	Pneumonectomy	1 case. Severe reactive airway disease.
Groudine and Lumb (22)	70–140	Pneumonectomy	4 cases. Severe reactive airway disease.
Glaisyer et al. (23) (FLMA)		Uvulopalatopharyngoplasty	2 cases. Both obese patients with respiratory distress.
Voyagis and Palumbi (24)	105	Pneumonectomy	57 yr old with a difficult airway
Sesano et al. (25)		Lung volume reduction	3 cases. All with severe emphysema to prevent barotrauma.
Current	480	cesarean section	26-yr-old with a difficult airway and HELLP syndrome

FLMA = Flexible LMA

mask ventilation (28). Aspiration, however, has been reported with the ProSeal™ LMA in association with an unidentified malposition (34). A disadvantage of the ProSeal™ over the classic LMA is that the first-time insertion success rate is less (28); however, the first-time success rate approaches 100% using laryngoscope-guided, gum elastic bougie-guided insertion (35), and this may be the technique of choice for airway rescue, even though CP must be briefly released during esophageal placement of the bougie. We did not use the bougie technique, as its efficacy was not established when this case occurred. A disadvantage of the ProSeal™ LMA compared with the intubating LMA is that it is less suitable as an airway intubator because of the narrow internal diameter of the airway tube. We elected to use the ProSeal™ LMA rather than the intubating LMA to avoid airway trauma, as it exerts lower pressures against the pharyngeal mucosa (36).

There are only two previous reports of ProSeal™ LMA use in the difficult airway. The first was for fiberoptic-guided awake insertion in a patient with a known difficult airway (37) and the second was in nine morbidly obese patients who were Cormack and Lehane grade 3–4 (38). The other nonsurgical airway option in this situation, according to the ASA Task Force Report, is the esophageal tracheal Combitube (39), but a recent study has shown that it exerts high pressures against the pharyngeal mucosa (40). The ASA algorithm recommends that tracheal intubation should only be planned after induction of anesthesia in two situations: first, if there are no anticipated difficulties, and second if the patient refuses/cannot cooperate with awake intubation (39). Interestingly, one study reported that the success rate for awake fiberoptic intubation and blind intubation with the Intubating LMA under anesthesia are similar, but patients are less satisfied with the awake technique (41).

Our case is the eighth describing LMA use for postoperative respiratory support (Table 2). Most previous cases involved the classic LMA (19–22,24,25), but one involved the Flexible LMA (23). Analysis of these reports reveals that it was used in 9 patients after lung surgery (21,22,24,25), in 2 patients after uvulopalatopharyngoplasty (23), in one patient after cardiac surgery (19), and in one patient after acute gastric surgery (20). In two patients the rationale for use was failed intubation (19,24), as in the current case, and in 11 patients its use was to avoid barotrauma or airway protective reflex activation (20–23,25). The duration of postoperative respiratory support ranged from 45 to 140 min. No problems were reported with the technique.

In summary, we report the use of the ProSeal™ LMA for failed obstetric intubation and postoperative respiratory support in a patient with HELLP syndrome. There is anecdotal evidence supporting the use of the LMA in failed obstetric intubation and for postoperative respiratory support. In principle, the ProSeal™ LMA may offer some advantages over the classic LMA in both these situations.

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