

I-Gel with LMA pro-seal: Hemodynamic changes

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Abstract

The LMA™ airway is an innovative supraglottic airway management device. Since its commercial introduction in 1988, the LMA™ airway has been used in over 200 million patients for routine and emergency procedures. The LMA Pro-Seal™ is an advanced form of airway that may be used for the same indications as the LMA Classic™. The Institutional Ethical committee approval was obtained before commencement of the study. Written informed consent was obtained from all the patients. A total of sixty adult patients between 18 and 50 years of ASA Physical status 1 & 2 of either sex was randomly selected from the routine list of surgical procedures under general anaesthesia were enrolled in the study. Among the groups, there was no significant difference between the preinduction, one, three and five minutes post insertion heart rate. When compared between the groups, there was no significant difference in the pre induction, one, three and five minutes post insertion mean blood pressure.

Keywords: I-GEL, LMA pro-seal, hemodynamic changes

Introduction

The I-GEL airway is a novel and innovative supraglottic airway management device, made of a medical grade thermoplastic elastomer, Styrene Ethylene Butadiene Styrene, which is soft, gel-like and transparent. The I-GEL is a truly anatomical device designed to create a non-inflatable anatomical seal of the pharyngeal, laryngeal and peri-laryngeal structures while avoiding the compression trauma that can occur with inflatable supraglottic airway devices [1].

I-GEL has several potential advantages including (a) easier insertion, (b) minimal risk of tissue compression, (c) stability after insertion (i.e. no position change with cuff inflation), and (d) latex free, sterile, single patient use device [2].

The buccal cavity stabiliser provides good vertical stability and axial strength upon insertion. It houses a standard airway channel and a separate gastric channel. It is not necessary to insert fingers into the mouth of the patient for achieving full insertion.

An integrated gastric channel can provide an early indication of regurgitation, facilitates venting of gas from the stomach and allows for the passing of a nasogastric tube to empty the stomach contents [3].

The lubricated I-GEL is firmly grasped along the integral bite block and the device is

positioned so that the I-GEL cuff outlet is facing towards the chin of the patient. The patient is positioned in the “*sniffing the morning air*” position with head extended and neck flexed. The chin is gently pressed down before proceeding to insert I-GEL. The leading soft tip is introduced into the mouth of the patient in a direction towards the hard palate. The device is glided downwards and backwards along the hard palate with a continuous but gentle push until a definitive resistance is felt [4]. After connecting the circuit to I-GEL, appropriate placement and ventilation is determined by the chest wall movement, auscultation of breath sounds, a square-wave capnography trace and no oropharyngeal leak [5].

The LMA™ airway is an innovative supraglottic airway management device. Since its commercial introduction in 1988, the LMA™ airway has been used in over 200 million patients for routine and emergency procedures.

The LMA ProSeal™ is an advanced form of airway that may be used for the same indications as the LMA Classic™. The LMA Pro-Seal™ is designed to provide additional benefits over the LMA Classic that extends the range of procedures for which an LMA™ airway is indicated. While the LMA Classic may be used with low - pressure positive pressure ventilation (PPV), the LMA Pro-seal has been specifically designed for use with PPV with and without muscle relaxation [6].

Methodology

Study design

This study was a randomized, prospective comparative study.

Study setting and population

The Institutional Ethical committee approval was obtained before commencement of the study. Written informed consent was obtained from all the patients. A total of sixty adult patients between 18 and 50 years of ASA Physical status 1 & 2 of either sex was randomly selected from the routine list of surgical procedures under general anaesthesia were enrolled in the study.

Patient selection

Inclusion criteria

- Age 18 to 60 years.
- Both sexes.
- Mallampatti 1 & 11.
- ASA physical status 1-11.

Patients undergoing elective surgery under general anaesthesia, expected to last less than 2 hrs.

Exclusion criteria

- Patients with limited mouth opening (less than 2 cm) and anticipated difficult airway.
- Any pathology of neck, upper respiratory tract or upper alimentary tract.
- Patients at increased risk of aspiration or having a history of symptomatic gastro-esophageal reflux or hiatus hernia.
- Patients with history of obstructive sleep apnoea.

Musculoskeletal abnormalities affecting the cervical vertebrae.

Materials

- Pro-seal Laryngeal mask airway (PLMA).
- GEL.
- IV cannulae.
- Monitors-ECG, pulse oximeter, capnography and Non-invasive Blood pressure monitoring.
- Drugs for general anaesthesia.

Study method

After obtaining ethical committee approval, the patients were randomized into one of the two groups.

- **Group A:** I-GEL for airway management.
- **Group B:** PLMA for airway management.

Patients were advised for preoperative overnight fasting for 10 hours. They were given aspiration prophylaxis with Tab Ranitidine 150 mg on the night before surgery and Inj. Glycopyrrolate 4 mcg/kg IV and Inj Midazolam. 02mg/kg i.v, was given one hour before induction.

Results

Table 1: Systolic BP

Systolic BP	I-Gel	Pro-Seal	P Value
Pre-Induction	110.23 ± 7.4	112.2 ± 8.37	0.17
At Induction	102.2 ± 4.82	103 ± 5.99	0.27
1 Minute	109.47 ± 10.09	108.27 ± 9.98	0.32
3 Minutes	109.5 ± 9.33	108.7 ± 9.39	0.37
5 Minutes	110.43 ± 9.62	108.67 ± 9.92	0.24

When compared between the groups, there was no significant difference between the pre induction, one, three and five minutes post insertion systolic blood pressure.

Table 2: Diastolic BP

Diastolic BP	I-Gel	Pro-Seal	P Value
Pre-Induction	67.43±4.74	68.43±4.69	0.20
At Induction	63.27±3.01	62.57±3.55	0.21
1 Minute	66.87±4.99	66.43±5.77	0.37
3 Minutes	68.1 ±5.18	67.17±4.97	0.23
5 Minutes	68.23±5.50	67.47±5.24	0.29

When compared between the groups, there was no significant difference between pre inductions, one, three and five minute's diastolic blood pressure.

Table 3: Mean BP

Mean BP	I-Gel	Pro-seal	P Value
Pre-Induction	81.67±5.24	83±5.37	0.16

Induction	76.1 ± 2.94	76.13±3.03	0.48
1 Min	81.3 ± 6.48	80.5 ±6. 90	0.32
3 Min	82 ± 6.50	81.1 ±6. 25	0.29
5 Mins	82.5 ± 6.79	81.33±6.72	0.25

When compared between the groups, there was no significant difference in the pre induction, one, three and five minutes post insertion mean blood pressure.

Table 4: Pulse rate

Pulse Rate	I-Gel	Pro-Seal	P Value
Pre-Induction	79.2 ±15.2	80.7 ±16.2	0.35
At Induction	77.6 ±13.9	74.9 ±14.3	0.23
1 Minute	80.3 ±15.22	79.7 ±14.3	0.43
3 Minutes	80.73±15.41	80.77±13.17	0.49
5 Minutes	79.77±15.59	79.83±14.14	0.49

Among the groups, there was no significant difference between the preinduction, one, three and five minutes post insertion heart rate.

Discussion

The anatomic position occupied by the Pro-Seal LMA is similar to but more extensive than the Classic LMA. It forms a seal with and provides a conduit to the respiratory and gastrointestinal tracts. The larger, conical shaped distal cuff fills the hypopharynx more completely, and the larger wedge shaped proximal cuff fills the proximal laryngopharynx more completely, both to form a better seal with their respective tracts. The dorsal cuff may press the ventral cuff more firmly into the periglottic tissues and the parallel, narrower tubing may allow the base of the tongue to cover the proximal cuff more effectively, enhancing its effectiveness as a plug in the proximal pharynx. The internal diameter of the Pro-Seal LMA airway tube is smaller than the Classic and Intubating LMA airway tubes, making it less suitable for passing instruments into the respiratory tract [7, 8].

In addition to the well-known characteristics of the LMA Classic, the LMA Pro-Seal offers the following features:

- A softer cuff material, deeper mask bowl and special cuff shape allows a higher seal than the LMA Classic for a given intracuff pressure with the adult sizes.
- A revised cuff arrangement, which allows a higher seal than the LMA Classic, for a given intra cuff pressure.

A channel (or drain tube) opening at the upper oesophageal sphincter to permit drainage of gastric secretions and access to the alimentary tract. The tube is also intended to prevent inadvertent gastric insufflation.

- A drain tube which allows for blind insertion of standard orogastric tubes, in any patient position, without the need to use Magill's forceps.
- A double tube arrangement which reduces the likelihood of mask rotation; the revised cuff profile, together with the flexible tubes, result in the device being more securely anchored in place.
- A built-in bite-block (except LMA ProSeal™ size1) which reduces the danger of airway obstruction or tube damage.
- A location strap for the LMA ProSeal™ Introducer, which also accommodates the index finger or thumb for manual insertion.
- The position of the drain tube inside the cuff prevents the epiglottis occluding the airway

tube. This eliminates the need for aperture bars.

The LMA ProSeal™ is designed to be a minimally stimulating airway device. When fully inserted using the recommended insertion technique, the distal tip of the cuff presses against the upper oesophageal sphincter. Its sides face into the pyriform fossae and the upper border rests against the base of the tongue ^[9].

Proximally the metal shaft forms a standard 15 mm connector for the anaesthesia circuit, and a rigid guiding handle serves both to insert the device, eliminating the need to insert fingers into the mouth and to stabilize and direct the device during intubation attempts.

The LMA Pro-seal maybe inserted using the standard index finger or the thumb technique, depending on access to the patient. The LMA ProSeal may also be inserted using the LMA ProSeal Introducer and bougie or gastric tube guided insertion. The dedicated Introducer may provide a more useful method of insertion than the thumb/ finger techniques, when using LMA ProSeal sizes 1 to 2½ ^[10].

All three techniques follow the same principles. To position the LMA airway correctly, the cuff tip must avoid entering the valleculae or the glottic opening and must not become caught up against the epiglottis or the arytenoids ^[11]. The cuff must be deflated in the correct wedge shape and should be kept pressed against the patient's posterior pharyngeal wall. To avoid contact with anterior structures during insertion, the inserting finger must press the tube upwards (cranially) throughout the insertion maneuver ^[12].

Conclusion

There was no significant haemodynamic response to insertion when compared between the two groups. Complication like post-operative sore throat were noted in the Pro-seal group.

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