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An Observational Study to Compare Ambu Auragain and Supreme Laryngeal Mask Airway for Controlled Ventillation Under Anaesthesia

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Abstract

Context: Not many studies have compared the new laryngeal mask airway (LMA) devices with pre-existing ones. We compared ambu auragain LMA with LMA supreme in this study for controlled ventilation under general anaesthesia. *Aims:* The main aim of this study was to the compare ambu auragain LMA with the LMA supreme for controlled ventilation during general anaesthesia. *Material and Methods:* 50 patients aged 18 to 50 years of American society of Anaesthesiologists (ASA) grade I and II of either gender, weight 30 to 70 kilogram, with Mallampatti grade -I/II posted for elective surgeries in supine position under general anaesthesia were randomly allocated into two equal groups. Group A (ambu auragain) and group S (LMA supreme). Both groups were compared for numbers of attempts and time taken for insertion of device, ease of insertion of nasogastric tube (NGT), oropharyngeal leak pressure, hemodynamic stability and any side effects or complications. *Statistical analysis:* The statistical analysis was assessed by unpaired student's t-test. $p<0.05$ was considered significant. *Result:* Both groups were statistically comparable in regard to number of attempts for placement and time of insertion of device, ease of insertion of NGT and haemodynamic stability. Group A had higher oropharyngeal leak pressure 32.0 ± 1.34 compared to Group S 26.0 ± 1.21 ($p=0.0001$). *Conclusion:* Ambu auragain can be a better alternative to LMA supreme for controlled ventilation under general anaesthesia due to high oropharyngeal leak pressure.

Keywords: Ambu auragain LMA, LMA supreme, oropharyngeal leak pressure, hemodynamic stability.

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Introduction

The laryngeal mask airway (LMA) has various advantages over the endotracheal tube for general anesthesia i.e. easy and quick placement, haemodynamic stability, minimal rise in intraocular and intracranial pressures and less incidence of sore throat in adults [1]. Second generation devices maintain pharyngeal seals with pressures of 25-30 cm H_2O. The performance of the both ambu auragain LMA and LMA supreme devices in patients in supine position have been reported to be similar; however, slight differences in seal pressure favouring the ambu auragain or in ease of insertion favouring the supreme LMA have been demonstrated [2].

Materials and Methods

After obtaining approval from the ethical committee and written informed consent, the present study was conducted

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at Dhiraj hospital, Piparia, Gujarat. 50 patients aged 18 to 50 years of american society of anaesthesiologists (ASA) I and II of either gender, posted for elective surgeries under general anaesthesia held in supine position were randomly allocated into two equal groups. Group A (ambu auragain) and group S (LMA supreme/SLMA).

Inclusion criteria:

- ASA grade I and II.
- Patients willing to give informed and written consent.
- Age between 18 to 50 years of both gender and weight 30 to 70 kg.
- Posted for elective surgery of short duration (< 2 hours)
- Posted for surgery requiring supine position only
- Mouth opening - Malampatti grade I/II

Exclusion criteria:

- Patients' refusal.
- BMI more than 30
- ASA physical status III and IV.
- Emergency surgical interventions
- Thoracic, abdominal and head and neck operations
- Patients with history of allergy or sensitivity to any medication, latex, or egg.
- Patients with advanced respiratory diseases
- Mouth opening <2.5 cm.
- Increased risk of aspiration (hiatus hernia, gastro-oesophageal reflux, full stomach)
- Pregnancy

A detailed pre-anaesthetic check-up and necessary investigations were carried out. All selected patients were given tab. alprazolam 0.25 mg and tab. ranitidine 150 mg orally on night prior to the surgery and were kept nil by mouth for 8 hrs.

On the day of surgery, the patient was brought to the pre anaesthetic room and base line vital parameters [heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), respiratory rate (RR), pulse oximetry (SpO_2) and temperature] were recorded. Patient was shifted to operation theatre. An i.v. line was secured with 18 G veinflow, a slow infusion of Ringer's lactate was started. All resuscitation equipments were kept ready. Standard multipara monitors were connected and the pre-induction electrocardiogram (ECG), HR, SBP, DBP and SpO_2 were recorded. Patient were premedicated with inj. ondansetron 4 mg, inj. glycopyrrolate 0.2 mg, inj. midazolam 0.1-0.2 mg kg^{-1}, inj. fentanyl 1-2 µg kg^{-1} , i.v. Prior to induction.

Patients were pre-oxygenated with 100% O_2 for 5 minutes. Anaesthesia was induced with inj. propofol 2-3 mg kg^{-1} and inj. succinylcholine 1-2 mg kg^{-1} i.v. Intermittent positive pressure ventilation with 100% O_2 through bag and mask was given. After adequate relaxation either ambu auragain LMA or LMA supreme was inserted as per random allotment of patient to the group. In group A the ambu auragain LMA was inserted according to weight; 30-50 kg: size 3 & 50–70 kg: size 4. In group S SLMA was also inserted according weight; 30-50 kg: size 3 & 50–70 kg: size 4.

A fully deflated either devices were initially lubricated on its posterior surface with water soluble jelly. It was then gently inserted in the "semi sniffing" position using a smooth circular rotating movements until definite resistance was felt when the device was in the hypopharynx. The LMA cuff was then inflated gradually as per manufacturer's instructions. The device was then fixed from maxilla to maxilla after bilateral air entry check.

Patients were maintained on controlled ventilation with 50% O_2, 50% N_2O, sevoflurane 2-3% and dose of non depolarizing muscle relaxant inj. atracurium loading dose 0.5 mg kg^{-1} and maintenance dose 0.1 mg kg^{-1}. All patients were monitored continuously for HR, SBP, DBP, SpO_2 and recorded every 15 minutes till the end of the surgery. Fluid requirement was calculated and replaced accordingly. At the end of the surgery, muscle paralysis was reversed by giving inj. glycopyrrolate 0.008 mg kg^{-1} and inj. neostigmine 0.05 mg kg^{-1}, then the device was gently removed after deflating the cuff when the patient regained consciousness and responded to verbal command. Post-operative incidence of airway complications caused by insertion of devices was recorded and was reassessed within 24 hours.

Two attempts of insertion were allowed. If more than two attempts, the case was excluded from the study.

Failed insertion was defined by any of these criteria: Failed passage into the pharynx, malposition (air leaks), ineffective ventilation (maximum tidal volume < 6 ml kg^{-1}). Correct placement of the device was confirmed by: Adequate chest movement on manual ventilation, expired tidal volume of more

than 8 ml kg^{-1}, no audible leak from the drain tube with peak airway pressure (PAP) less than 20 cm H_2O. A leak below 20 cm H_2O was taken as significant and suggested a malposition.

The time from picking up the prepared ambu auragain LMA or SLMA (cuff fully deflated, lubricated) and successful placement and connection of the ventilator circuit was recorded.

With the LMA in place, a well lubricated 14 FG NGT was passed through the drain tube of the LMA.

Ease of insertion was noted as:

Easy: Insertion at first attempt without any tactile resistance.

Difficult: Insertion successful at second attempt.

Failed: Insertion failed at second attempt

Placement of the gastric tube in the stomach was confirmed by the aspiration of gastric contents or simultaneous injection of air and epigastric auscultation.

Once anesthesia and ventilation had stabilized, the oral leak pressure (OLP) was determined by transiently stopping ventilation and closing the adjustable pressure limiting valve with fresh gas flow of 3 L/min (for safety, the airway pressure was not allowed to exceed over 40 cm H_2O). This was the airway pressure generated when a leak was detected by an audible leak from the mouth.

Both groups were compared for numbers of attempts and time taken for insertion of device, ease of insertion of nasogastric tube (NGT), OLP, hemodynamic stability and any side effects or complications.

The statistical analysis was assessed by unpaired student's t-test. $p < 0.05$ was considered significant.

Results

Total 50 patients were allocated for the study. Both groups were comparable in respect to age, gender, weight and ASA.

Table 1: Demographic Characteristics

	Group A	Group S	p value S-Significant NS-Not significant
Age (years)	35.03 ± 10.11	34.66 ± 9.18	0.64 NS
Sex (Male/Female)	10/15	11/14	0.89 NS
Weight (kg)	55.0 ± 7.09	48.83 ± 8.35	0.57 NS
ASA grade (I/II)	19:6	17:8	0.10 NS

Table 2: No. of attempts

Group	I	II	pvalue Significance
A	23(92%)	2 (8%)	0.89 NS
S	22 (88%)	3 (12%)	

Table 3: Time of insertion of device

	Group A	Group S	p value Significance
Duration in seconds	15±2.76	17±2.88	0.037 NS

Table 4: Ease of insertion of gastric tube

Ease	Group A	Group S
Easy	24 (96%)	24 (96%)
Difficult	1 (4%)	1 (4%)
Failed	--	--

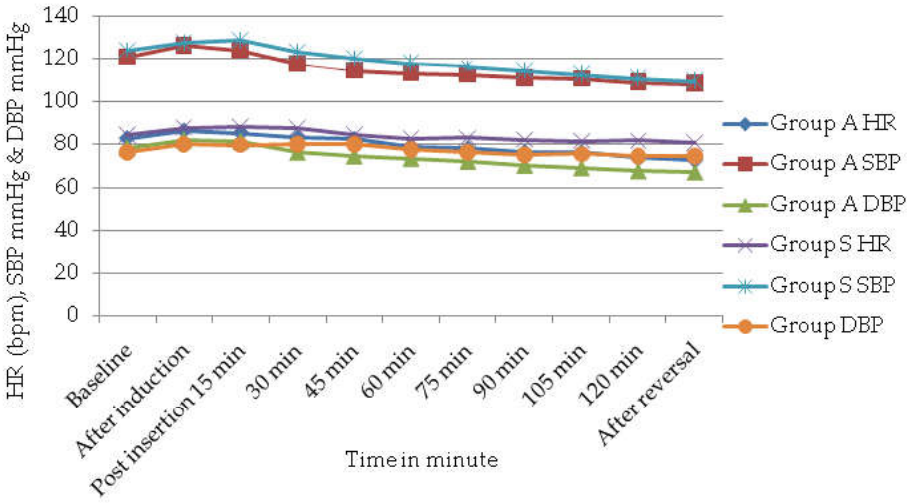

Chart 1: Changes in HR, SBP and DBP between both groups

Table 5: Oropharyngeal Leak Pressure

	Group A	Group S	p value Significance
OLP (mmHg)	32.0±1.34	26.0 ± 1.21	0.0001 S

Table 6: Complications

Complication	Group A (n=25)	Group S (n=25)
Sore throat	3 (12%)	2 (8%)
Blood staining of device	3 (12%)	4 (16%)
Dysphagia/lip/tongue injury	2 (8%)	2 (4%)
Nausea/Vomitting	0	0

Discussion

Supraglottic airway devices (SGAD) have been modified in various ways following the overwhelming success of the laryngeal mask airway (LMA). Second-generation SADs incorporate specific features to improve positive pressure ventilation (PPV) and reduce the risk of aspiration. Thus SAD are nowadays more frequently used in laproscopic surgeries and even in lateral or prone position of patients [3].

In the present study 50 patients of ASA I and II were randomly assigned to two groups of 25 patients each. Patient demographic data were comparable in both the groups as evident from the table 1. Our study was quite similar demographically with Jagganathan N, Sohn et al. [4] studies.

In group A – Ambu auragain LMA was successfully inserted in first attempt in 23/25 patients (92%) and only 2/25 patients (8%) required second attempt while in group S- with SLMA it was 22/25 patients (88%) and 3/25 patients (12%) (Table 2). The calculated p value showed there was no statistical significance between both groups (p >0.05). Our results were very similar to Wong DT et al. [5], Jagganathan N [4], Lopez AM et al. [6] study whose first attempt success rate and ease of insertion for LMA were similar.

The time of insertion of device in group A was 15.53 seconds as compared to 22.60 seconds in group S. The p value (< 0.0001) is statistically highly significant (Table 3).

For both the devices in all 50 patients, gastric access was achieved using a lubricated 16- FG NGT with similar success rates. Gastric tube was placed in 24/25 patients (96%) with ease in group A with only 1/25 patient (4%) faced difficulty where as 24/25 patients (96%) in group S were easily placed and 1/25 patient (4%) faced difficulty. There is no difference in first attempt insertion of gastric tube

(Table 4). Shariffuddin I et al. also observed ease of gastric tube insertion was faster and easier for both LMA which was similar to our findings [7].

The ambu auragain LMA achieved a slight but significantly higher airway seal pressure (32 vs 26 cm H_2O achieved by the SLMA, p value < 0.05) (Table 5). These results are in line with Wong DT et al., observed that LMA was inserted using a standard technique with the cuff inflated to 60 cm H_2O. The groups were compared for the primary outcome of OLP. 165 (n = 81, ambu auragain LMA; n = 84, SLMA) completed the study. Demographics were similar between the groups. The mean OLP was significantly higher in the ambu auragain LMA than in the SLMA group i.e 26.4 (2.8) cm H_2O vs 21.6 (3.4) cm H_2O. Shariffuddin et al. had similar OLPs and performed satisfactorily which is contrasting from the finding of our study [7].

Hemodynamic parameters were comparable between both groups throughout the course of the surgical procedures. In the present study, no significant statistical differences were observed between the groups (Chart 1). Almost all the studies including Lakesh K Anand et al. [8] demonstrated that hemodynamic and ventilator parameters were comparable in both groups.

In our study in group A blood staining of device was seen in (3/25) patients 12%, (3/25) patients 12% complained of sore throat post operatively and (2/25) patients 8% had minor lip, dental injury or mild dysphagia post-operatively. In group S -blood staining of device was seen (4/25) patients 12%, (2/25) patients 4% complained of sore throat and 4% (2/25) dysphagia, minor lip, tongue trauma, nausea or vomiting. Post-operatively complications were low and comparable in both groups. None of the group patients suffered laryngospasm, bronchospasm, regurgitation or aspiration (Table 6). A M Lopez et al. [6] (blood on masks 7% and 8% and sore throat 3% and 5% in PLMA and SLMA), Shariffuddin et al. [7], showed similar low incidence rates of sore throat and blood on device.

High intra-cuff pressure in LMAs impedes pharyngeal mucosal perfusion and this factor may lead to pharyngolaryngeal complications. The cuff pressure in our study was maintained by inflating the cuff with prescribed volume of air only. So there was few postoperative complications.

Conclusion

From the present study we conclude that among both supraglottic airway devices ambu auragain LMA is a preferred alternative over SLMA as it requires less numbers of attempts, less time for insertion, easier to insert with lower incidence of pharyngolaryngeal injury

Ambu auragain LMA can be a better alternative to SLMA for controlled ventilation under general anaesthesia as oropharyngeal leak pressure is higher in ambu auragain LMA.

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