

## COMPARISON OF MEAN ARTERIAL PRESSURE (MAP) CHANGES ON LARYNGEAL MASK AIRWAY INSERTION WITH PROPOFOL AND SEVOFLURANE

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### ABSTRACT:

#### INTRODUCTION:

Stability of Mean Arterial Pressure pre-operatively, during procedure(s) and post-operatively is of great concern to the healthcare practitioners in the field of anesthesia. Laryngeal mask airway (LMA) is considered a secure technique of airway management both in emergency and in elective procedures. Among several practices of LMA insertion, Propofol i.v. and Sevoflurane inhalation induction are most favorite and commonly used.

#### OBJECTIVES:

To study the Mean Arterial pressure stability in patients receiving sevoflurane inhalational induction for LMA insertion in comparison with the patients undergoing LMA insertion with propofol intravenous induction of anesthesia.

**STUDY DESIGN:** Randomized controlled trial.

#### SETTING AND DURATION:

Department of anesthesia and intensive care Allied Hospital Faisalabad. Study was carried out over a period of six months from 28-05-2012 to 28-11- 2012.

**SAMPLE SIZE:** 90 patients (45 patients in each group i.e. receiving Propofol or Sevoflurane).

#### MATERIALS AND METHODS:

A total of 90 patients (45 patients in each group) ranging from the age of 18 years to 34 years were included in this study. Sample population includes patients with a random set of surgical needs. In group A, patients were given propofol i.v. induction for a variety of surgical procedures and in group B, patients were anesthetized using sevoflurane induction again for a random set of surgical procedures.

#### RESULTS:

Mean age of patients in Group A was 25.78 and 25.27 in Group B. Frequency of patients according to ASA status was 35 ASA-I and 10 ASA-II in Group A and 30 and 15 in Group B respectively. Mean Arterial Pressure dropped in 15 patients (33.3%) of Group-A and 3 patients (6.6%) in group B.

#### CONCLUSION:

In this study, it was found that sevoflurane inhalational induction for LMA insertion is associated with stable Mean Arterial pressure, and therefore, valuable.

**KEY WORDS:** Laryngeal Mask Airway, Propofol, Sevoflurane, Mean Arterial Pressure.

#### INTRODUCTION:

For the last two decades laryngeal mask airway (LMA) is a preferred choice especially for the ambulatory patients. Unrestricted and swift air-way is basic to safe anesthesia.<sup>1</sup> Propofol and Sevoflurane induction are in

competition for LMA insertion. Propofol is considered a good intravenous (IV) anesthetic

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agent for relaxing reflexes of air-way.<sup>2</sup> On the other hand Sevoflurane is an Inhalation agent with acceptable odor that does not irritate airway reflexes.<sup>3</sup> For airway management in both emergency medicine and anesthesia LMA is used with full confidence.<sup>4,5</sup> It is considered a secure and trouble-free scheme for airway control.<sup>6</sup> The scheme was originally designed by Brain in 1981 and put into clinical practice in 1988.<sup>5</sup> It consists of a tube with an inflatable cuff that is inserted into the pharynx. It causes less hemodynamic stress response, pain and coughing than an endotracheal tube.<sup>4</sup> There is a need of an anesthetic depth slightly larger than required for insertion of an oral airway.<sup>7</sup> LMA is not only popular but actually it is the most optimal induction technique.<sup>8</sup> Many other induction and insertion methods have been described with variable results.<sup>5</sup> Intravenous (IV) propofol is the most popular method of anesthetic induction for laryngeal mask airway<sup>9</sup>, because this way you achieve rapid induction and relaxes airway reflexes.<sup>4,9</sup> There are some reported adverse effects associated with propofol e.g. pain on injection site, hypotension and apnea.<sup>9</sup> On the other hand, Sevoflurane is an inhalational anesthetic agent<sup>4</sup>. It seems to be an ideal agent for inhalational anesthesia induction. It improves the conditions of overall anesthesia induction as compared to other volatile agents.<sup>9</sup> Patient is transited to maintenance phase without period of apnea but this method is associated with longer time for both jaw relaxation and insertion of laryngeal mask airway.<sup>4</sup> Many studies have been conducted throughout the world so far, which have compared a number of parameters like ease of insertion, hiccups, airway obstruction, laryngospasm, cough, and odor perception after LMA insertion with sevoflurane and propofol. So, the aim of this study is, to explore the drug with less Mean Arterial Pressure (MAP) changes on LMA insertion. As it will help us in our setup to use LMA with less changes in MAP in minor procedures like fibroadenoma removal, where, the time weighted average of arterial pressure during a pulse cycle is mean arterial pressure (MAP). It can be estimated as  $MAP =$

$(SBP+2DBP)/3$ , (SBP = systolic blood pressure, DBP = diastolic blood pressure),  $MAP < 70$  mmHg will be considered significant after 3 minutes of LMA insertion. The Hypothesis of the study is, Sevoflurane produces less Mean Arterial Pressure changes on LMA insertion than propofol intravenous induction.

## MATERIALS AND METHODS:

This study was carried out at the department of anesthesia and intensive care, Allied Hospital Faisalabad for a period of six months from 28-05-2012 to 28-11-2012.

Sample size:

By using WHO sample size calculator for 2 mean

Group 1 79.9  $\pm$  7.5 mmHg<sup>2</sup>

Group 2 84.2  $\pm$  7.03 mmHg<sup>2</sup>

Level of significance = 5%

Power of test = 80%

Sample size = 90 (45 in each group)

## STUDY DESIGN:

Randomized controlled trials.

## SAMPLING TECHNIQUE:

Non probability, consecutive sampling.

## INCLUSION CRITERIA:

- Age group 18-35 years.
- Both male/female
- Patients undergoing elective fibroadenoma removal, Herniorrhaphy etc.
- ASA grade I (patients with no other systemic disease) & ASA grade II (with some mild systemic illness but no functional limitation).

## EXCLUSION CRITERIA:

- Patients undergoing emergency surgery.
- Patients with previous history of propofol allergy.
- Patients having any contraindication to LMA insertion like full stomach, abdominal surgery etc.

## DATA COLLECTION PROCEDURE:

90 cases of elective minor surgical procedures fulfilling the inclusion criteria were identified from surgical wards of allied hospital. Patients who fulfill the inclusion criteria like age between 18-35 years of age, ASA grade 1, ASA grade 2, comparable weight and height

were selected for study. Written informed consent (explaining risks and benefits ratio, purpose and procedure of study to patient) was taken. The demographic information like name, age, registration no. address was noted.

Using random number table generated by computer, patients were allocated randomly to the two groups:

Group A: (control group) patients who will receive intravenous propofol for LMA insertion.

Group B: (experimental group) patients who will receive sevoflurane for LMA insertion. Drugs were administered by consultant anesthetist. All patients were visited a night before surgery to make a good rapport. Procedure was explained and discussed with each patient. Variable of interest (Mean arterial pressure) was noted. The primary outcome measure was Mean Arterial Pressure stability on LMA insertion. MAP was noted in operation theatre before induction of anesthesia and three minutes after LMA insertion. Mean Arterial Pressure was noted with the help of electronic blood pressure recording apparatus and results were recorded as whether change in Mean Arterial Pressure has occurred or not. All this information was recorded on a specially designed Performa.

### DATA ANALYSIS:

The collected information will be entered and analyzed into SPSS version 13.

Descriptive statistics were calculated for all variables.

1. Mean and standard deviation was calculated for all quantitative variables like age, mean arterial pressure at baseline and after 3 minutes.

2. Frequency and percentage were calculated for all qualitative variables like ASA status and gender 3. Independent sample t -test was used as a test of significance for quantitative variables that is mean arterial pressure. P-value less than 0.05 was taken as significant.

### RESULTS:

A total of 90 patients were included during the study period of six months and further separated in two groups (45 patients in each

group). Group- A received Propofol iv induction and Group- B was induced with sevoflurane inhalation. Most common age group in both groups was 23-28 years and least common was 30-35 years old. Mean age of the patients of group-A was 25.78  $\pm$  4.10 and 25.27  $\pm$  4.37 Of Group-B shown in Table 1.

**Table 1: Distribution of patients by age**

Group	N	Minimum	Maximum	Mean	SD
Group A	45	18	33	25.78	4.10
Group B	45	18	34	25.27	4.34

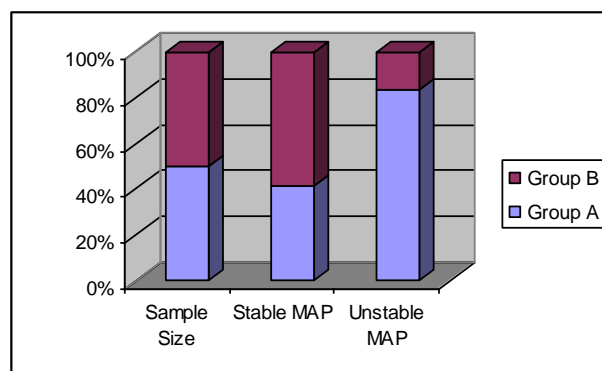
Regarding ASA status 35 Patients in Group-A were of ASA-I and 10 ASA-II. While in Group-B 30 patients were ASA-I and 15 ASA-II. Percentage was 77.8 and 22.2 in Group-A and 66.7 and 33.3 in Group-B respectively, represented by Table 2.

**Table 2: Distribution of patient by ASA Status**

ASA status	GROUP A		GROUP B	
	Frequency	%	Frequency	%
1	35	77.8	30	66.7
2	10	22.2	15	33.3

Mean Arterial Pressure changes occurred in 15(33.3%) patients in Group-A, while in Group-B patient's MAP remained unchanged in 42 patients and only 3 (6.6%) patients exhibited change in MAP as shown in Figure 1.

**Figure 1: Mean Arterial Pressure Stability**



Independent sample t-test and paired sample t-test were also applied further MAP variations were recorded after 3 minutes, the results

clearly showed that sevoflurane inhalation outperformed over propofol IV insertion and values are shown in Table 3.

**Table 3: Distribution of patients by hemodynamic changes.**

Variable	Group A (n = 45)	Group B (n = 45)	p-value (Independent sample t-test)
Mean arterial pressure at baseline	85.6+-1.25	90.51+-0.76	0.0001
Mean arterial pressure after 3 min	79.91+-2.13	90.49+-0.69	0.0001
p-value (Paired sample t-test)	0.0001	0.0001	

## DISCUSSION:

In our study, we demonstrated that insertion of LMA with Sevoflurane is associated with less change in Mean Arterial Pressure as compared to Propofol on LMA insertion.

Propofol is an intravenous anesthetic agent available in 1% and 2% formulation consisting of imidazole ring and is hydrophobic.<sup>10,11</sup> It is a good induction agent and it has superiority over the other competitor like thiopentone and midazolam in regard that it blunts airway reflexes better than those, hence provides better conditions for insertion of LMA.<sup>12,13</sup> But at the same time it has some disadvantages like pain on injection site, rapid drop in mean arterial pressure, and involuntary movements.<sup>14,15</sup>

Sevoflurane a good inhalational anesthetic, which is pleasant to smell, does not irritate airways and a good choice for induction of anesthesia for LMA insertion.<sup>16</sup> It is suitable for quick inhalational induction technique even in high concentrations because of its low blood gas solubility (0.69) and minimal respiratory irritant effect. The vital-capacity induction technique has advantages over the intravenous induction of anaesthesia. The risk of anaphylaxis with intravenous agents, although small, is avoided and the hangover effect associated with intravenous agent is also avoided.<sup>17</sup> Inhalational induction is also a better choice in case of children as well as in patients with fear of needles.<sup>18</sup>

Insertion of Laryngeal mask airway is associated with less cardiovascular disturbances as compared to endotracheal tube insertion and laryngoscopy, so it is of choice in patients for whom marked presser response is not desired.<sup>19,20</sup> Same is the case with inhalational induction, it is not only good for stable patients but is also beneficial for patients with poor cardiovascular reserve.<sup>21</sup> The study performed by Siddik SM et al demonstrates that when haemodynamics are compared in patients receiving Propofol and Sevoflurane for LMA insertion it was found that Propofol iv induction group had MAP 90+-14 at baseline and 81+-14 at 3 min. While Sevoflurane group had MAP 91+-14 at baseline and 87+-15 at 3 min. so, it showed that Sevoflurane results in stable MAP then Propofol.<sup>22</sup>

In another study, carried out by Lian K et al propofol produced a larger decrease in mean blood pressure compared with sevoflurane. Compared with baseline, the average decrease in mean blood pressure during the study period was 18.7% (0%-41%) and 17.0% (2%-43%) in the propofol and sevoflurane groups respectively.<sup>23</sup>

In the study of keti I et al sevoflurane was found to be a good alternative of propofol for induction of anesthesia for LMA insertion with fewer complications but longer time.<sup>2</sup>

## CONCLUSION:

In this study, it is proved that sevoflurane induction is associated with stable cardiovascular profile and, therefore, is valuable technique in patients presenting some allergies to IV drugs and in whom cardiovascular unstability is deleterious.

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