

A comparative study between propofol vs. thiopentone plus Lidocaine effects on hemodynamic changes during laryngeal mask airway (LMA) insertion in urological surgery in Baghdad hospital.

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ABSTRACT

During the induction of general anesthesia, the stability of hemodynamic parameters is very important. In an ideally, all patients would be care by their anesthetists adequately to reduce all risks without interfering with the soft running of the operating list. The hemodynamic instability throughout anesthesia can be decrease by using numerous pharmacological agents and combinations have been prepared for that. Thiopentone and Propofol are intravenous anesthetics having comparatively diverse hemodynamic influences and adverse effects. Appropriate maintenance of airways securing during surgical operations is considered as the basic fundamental responsibility of an anesthesiologist. By using the modern laryngeal mask airway (LMA) with sufficient muscle relaxation, appropriate anesthetic depth and airways reflexes depression, the common problems of airway management as well as the complications after LMA insertion procedure are preventing. Our study aimed to assess the comparison effects of two anesthetic induction agents (propofol vs. thiopental- lidocaine admixture on the hemodynamic changes (heart rate (H.R), respiratory rate (R.R), oxygen saturation (SpO₂), Blood pressure systolic (S.B.P) and diastolic (D.B.P) during LMA insertion for four (4) different time intervals (pre induction, at induction, at LMA insertion as well as after 5 min after LMA insertion). The current study was enrolled in Baghdad educational hospital includes one hundred fifty (150) patients who were divided into equally groups, (115 male and 35 female) 75 for each group, aged (20-60) years, all patients were submit to ASA (I, II), physical grade planned for elective surgical operations under general anesthesia (G.A). All the patients were evaluated clinically, assessed and investigated prior to surgery. The allergic history or adverse reactions of barbiturate or propofol were excluded. Patients were divided into: Group (A) is receiving 2.5mg/kg (I.V) of propofol as an induction agent (n=75), and Group (B) is receiving 5mg/kg (I.V) thiopentone plus lidocaine 2mg as an induction agent also (n=75). The induction induces by either propofol or thiopentone as induction agent.

Before the laryngeal mask airway (LMA) insertion, pre- oxygenation is assisting from 2-3 minutes with 100% oxygen immediately. LMA insertion was distinguished by patient's responses to the presence or lack of laryngospasm, gagging, coughing, limb and head movement. The hemodynamic parameters (heart rate (H.R), blood pressure "systolic (SBP) and diastolic (DBP)", respiratory rate (R.R) and oxygen saturation (SpO₂)) changing monitor in four (4) time intervals (pre induction, at induction, at LMA insertion as well as after 5 min after insertion). Heart rate and blood pressure were decreased significantly ($p < 0.01$) in propofol group than thiopentone plus lidocaine group after insertion of LMA. For oxygen saturation (SpO₂), the differences were insignificant at $p < 0.01$. Also, the results show that there are significant differences at ($p < 0.01$) for respiratory rate between the two studying groups. thiopentone at the dose of 5mg/kg plus lidocaine 2 mg, since the dose of 2.5mg/kg of propofol is better-quality to the dose of 5mg/kg of thiopentone plus lidocaine 2 mg could be more preferred during LMA insertion with reverence to unstable patient's hemodynamic response.

Key words: Induction; Laryngeal mask airway; Propofol; Thiopentone; lidocaine; hemodynamic changes.

Introduction:

Hemodynamic stability is very much important in surgical patients during induction of general anesthesia (G.A). Thus, anesthetic agent with minimum effect on blood pressure (B.P) and heart rate (H.R) would be the agent of choice for general anesthesia. Thiopentone and propofol are intravenous anesthetic agents having comparatively different adverse effects and hemodynamic influences. Propofol is widely used and has replaced thiopental as the first choice for anesthesia induction and sedation. As another substitute to some cases to tracheal intubation (ETT) and to the face mask, the inducing importance of anesthesia has guided to the greater accept of laryngeal mask airway (LMA). It ensures a better control of the airway leaving the anesthesiologist's hands free, since many injuries to the laryngeal inlet, sore throat as well as soft tissues of pharynx that occurs post extubation may be result due to intubation and laryngoscope, (1). Laryngeal mask airway (LMA) was integrated in ASA difficult airway algorithm (2).

An adequate depth of anesthesia is needed during LMA insertion as the device cannot be inserted except that pharynx jaw and jaw are entirely within stress-free. The selection of the intravenous induction agent will influence the intubation situations determining by its capacity of obtunding the pharyngeal and laryngeal reflexes (3).

Through the general anesthesia delivering, airway securing by using the tracheal intubation in the trachea has become a routine important part of, since the activity of sympathetic and sympathoadrenal reflexes can be enhanced by the laryngoscope and tracheal intubation that may be result hypertension, Tachycardia, dysarrhythmias which are undesirable especially in patients with cardiac comorbidity(4).

The hemodynamic changes are less happened with using the laryngeal mask airway (LMA) in comparison with tracheal intubation. Also, the LMA insertion associated with minimal elevation in the intraocular pressure, less sore throat incidence especially in eye or ENT surgery, make it a super alternative than the endotracheal tube (ETT) (4). The blind insertion of a new form of airway (LMA) into the pharynx to form a good sealing over the larynx in order to provide the anesthetist's hands with clear airway (5, 6).

The supraglottis airway management like as the laryngeal mask airway (LMA) is used in order to increase the efficiency of gas exchange (7). The laryngeal mask airway (LMA) has many types such as classic LMA, ProSeal LMA, cobra LMA and other with different uses (8, 9, 10, 11 and 12). Many complications may be result from LMA insertion like as ProSeal LMA including laryngeal edema, airway obstruction, malposition(13, 14, 15, 16), gastric distention, gastroesophageal reflux may be without aspiration(17, 18, 19).

This intravenous anesthetic agent as a phenol derivative that is used potentially in 1980, a dose of 1.5– 2.5 mg kg⁻¹ is required to induce anesthesia for healthy adults. It has a great popularity occurs by propofol due to its antiemetic strength and it more favorable in the recovery stage. In healthy patients, after induction of anesthesia with propofol, a greater reducing level of arterial pressure than with thiopental; the diminution results predominantly from vasodilatation. With propofol, heart rate may increase slightly after induction of anesthesia (20).

After induction, propofol may cause apnea commonly, and for a longer duration, than after thiopental. During propofol infusion, respiratory rate higher and tidal volume is lower than in the conscious state. The ventilatory response to carbon dioxide also decreases (21).

Propofol is indicated particularly when fast early recovery of consciousness is requisite. Two hours after anesthesia, there is no variation in psychomotor role between patients who have expected propofol and those given thiopental or methohexital, but the former experience less drowsiness in the ensuing 12 h. The quick recovery characteristics are missing if induction is followed by maintenance with inhalational agents for longer than 10–15 min. The rapid redistribution and metabolism of propofol may raise the risks of awareness through tracheal intubation after the administration of non-depolarizing muscle relaxants, or at the start of surgery, unless the appropriate mixture of inhaled anesthetics are ventilated through the lungs or further doses of infused propofol are administered (22).

This is the most popular local anaesthetic as it is safe, rapidly metabolized, and has a short duration of action. Efficacy is enhanced markedly by addition of adrenaline. A testament to the relative safety of the use of lidocaine is the fact that the drug is used systemically as a class 1b antiarrhythmic and in the treatment of chronic pain that is refractory to alternative approaches (20, 22).

A dose 2.5% thiopental solution is administered I.V can be depress peripheral vasodilatation and myocardial contractility mainly with rapid, large administered doses are administered by I.V injection. Cardiac or hypovolaemic diseases can be accompanied with pressure decreasing and through hypotension. Often there is a reflex of tachycardia and heart rate inhibition. Ventilatory drive is reduced by thiopental as a result of decreased sensitivity of the respiratory centre to carbon dioxide. A little time of apnea is common, repeatedly preceded by a few deep breaths. There is an induction in bronchial muscle tone, although frank bronchospasm is uncommon. Thiopental is less satisfactory than propofol in this respect, and appears to inhibit the parasympathetic laryngeal reflex arc to a lesser coverage than other areas of the C.N.S(23).

Patients and methods:

The current study that done that done in Baghdad educational hospital which enrolled one hundred fifty (150) patients, both (115 male and 35 female). The age groups of patients are range from (20-60) years. All patients submitted to American Society of Anesthesiologists (ASA) with physical grades (I, II), planned for elective surgical operations under general anesthesia (G.A), also the patients are evaluating clinically, assessed and investigated prior to surgery. The allergic history or adverse reactions of barbiturate or propofol were excluded. Patients were divided into: Group (A) is receiving 2.5mg/kg (I.V) of propofol as an induction agent (n=75) and group (B) is receiving 5mg/kg (I.V) thiopentone plus lidocaine 2mg as an induction agent (n=75). The induction induces by either propofol or thiopentone as induction agent (n=75). Before the laryngeal mask airway (LMA) insertion, pre-oxygenation was assisted from 2-3 minutes with 100% oxygen before LMA insertion. Patient's responses to LMA insertion were noted in presence or lack of gagging, laryngospasm, limb and head movement and coughing. Response to LMA insertion was graded mild, moderate or severe.

In our study, all (150) were selected with mild response, patient with moderate and severe response neglected, Monitoring of the patient:

- 1- Measuring of non-invasive blood pressure (NIBP), systolic then diastolic blood pressures and mean arterial blood pressure (MAP).
- 2- Pulse oximetry measured oxygen saturation and heart rate.
- 3- ECG measured heart rate and arrhythmia.
- 4- Respiratory rate.

The data were analyzed by the Statistical Package for the Social Sciences (SPSS).

Table (1): Show the statistical analysis (Mean, standard deviation-test for hemodynamic parameter (heart rate (H.R)) changing between Propofol group & Thiopental plus lidocaine group during induction, at LMA insertion and 5 minute after insertion of LMA.

Table (1) :Comparison between Propofol group & Thiopental plus lidocaine group on hemodynamic parameter, heart rate (H.R) at different time intervals.

Groups study	N	Mean± Std.	t- test	P-Value	C.S
HR-Pre.Induction/ Propofol	150	85.32±1.32	10.781	0.000	P< 0.01
HR-Pre.Induction/ Thiopental plus xylocaine	150	85.85±1.76			(NS)
HR-At.Induction/ Propofol	150	83.15±3.28	13.227	0.000	P< 0.01
HR- At.Induction/ Thiopental plus xylocaine	150	88.60±1.77			(S)
HR-At.insertion/ Propofol	150	85.60±4.59	14.325	0.000	P< 0.01
HR-At.insertion/ Thiopental plus xylocaine	150	88.81±1.84			(S)
HR- 5 min after insertion of LMA/ Propofol	150	85.45±2.46	49.33	0.000	P< 0.01
HR-5 min after insertion of LMA/ Thiopental plus xylocaine	150	88.75±2.47			(S)

For the respiratory rate (R.R) as a hemodynamic parameter, the comparative effect between the propofol and the thiopentone –lidocaine admixture that revealed at different time intervals in table (2).

Table (2) : Comparison between Propofol group & Thiopental plus lidocaine group on hemodynamic parameter, the respiratory rate (R.R) at different time intervals.

Groups study	N	Mean± Std.	t- test	P-Value	C.S
RR-Pre.Induction/ Propofol	150	12.30±1.11	5.662	0.000	P< 0.01
RR-Pre.Induction/ Thiopental plus xylocaine	150	11.33±1.32			(NS)
RR-At.Induction/ Propofol	150	11.01±0.82	171.924	0.000	P< 0.01
RR- At.Induction/ Thiopental plus xylocaine	150	11.24±0.84			(NS)
RR-At.insertion/ Propofol	150	10.05±0.93	109.249	0.000	P< 0.01
RR-At.insertion/ Thiopental plus xylocaine	150	11.00±0.83			(NS)
RR- 5 min after insertion of LMA/ Propofol	150	8.41±0.87	284.048	0.000	P< 0.01
RR-5 min after insertion of LMA/ Thiopental plus xylocaine	150	9.55±0.92			(S)

In table (3); the comparative effect between propofol and thiopentone plus xylocaine on the oxygen saturation (SpO₂). .

Results:

Table (3): Comparison between Propofol group & Thiopental plus lidocaine group on oxygen saturation (SPO₂) hemodynamic parameter at time intervals.

Groups study	N	Mean± Std.	t- test	P-Value	C.S
SPO ₂ -Pre.Induction/ Propofol	150	97.71±12.45	9.126	0.000	P< 0.01 (NS)
SPO ₂ -Pre.Induction/ Thiopental plus xylocaine	150	97.83±12.70			
SPO ₂ -At.Induction/ Propofol	150	98.02±0.89	7.116	0.000	P< 0.01 (NS)
SPO ₂ - At.Induction/ Thiopental plus xylocaine	150	97.92±8.93			
SPO ₂ -At.insertion/ Propofol	150	99.20±1.65	12.836	0.000	P< 0.01 (NS)
SPO ₂ -At.insertion/ Thiopental plus xylocaine	150	99.29±2.51			
SPO ₂ - 5 min after insertion of LMA/ Propofol	150	100.91±0.83	9.055	0.000	P< 0.01 (NS)
SPO ₂ -5 min after insertion of LMA/ Thiopental plus xylocaine	150	100.15±1.64			

The statistical analysis can represent in table (4, 5): since the systolic and diastolic blood pressure parameters that change at different time intervals during the comparison between the two studying groups.

Table (4): Comparison the between Propofol group & Thiopental plus lidocaine group on the systolic blood pressure (SBP) parameter at time intervals.

Groups study	N	Mean± Std.	t- test	P-Value	C.S
SBP -Pre.Induction/ Propofol	150	122.00±8.19	34.171	0.000	P< 0.01 (HS)
SBP -Pre.Induction/ Thiopental plus xylocaine	150	130.00±5.33			
SBP -At.Induction/ Propofol	150	99.00±7.44	69.109	0.000	P< 0.01 (HS)
SBP - At.Induction/ Thiopental plus xylocaine	150	127.06±2.47			
SBP -At.insertion/ Propofol	150	141.50±8.60	433.548	0.000	P< 0.01 (HS)
SBP -At.insertion/ Thiopental plus xylocaine	150	150.20±8.36			
SBP - 5 min after insertion of LMA/ Propofol	150	118.10±8.07	104.096	0.000	P< 0.01 (HS)
SBP -5 min after insertion of LMA/ Thiopental plus xylocaine	150	127.50±6.96			

Table (5): Comparison between Propofol group & Thiopental plus lidocaine group for diastolic blood pressure (DBP) parameter at different time intervals.

Groups study	N	Mean± Std.	t- test	P-Value	C.S
DBP -Pre.Induction/ Propofol	150	74.89±5.06	70.184	0.000	P< 0.01 (S)
DBP -Pre.Induction/ Thiopental plus xylocaine	150	79.01±4.50			
DBP -At.Induction/ Propofol	150	74.45±7.55	7.508	0.000	P< 0.01 (S)
DBP - At.Induction/ Thiopental plus xylocaine	150	77.34±3.06			
DBP -At.insertion/ Propofol	150	81.93±10.98	125.072	0.000	P< 0.01 (HS)
DBP -At.insertion/ Thiopental plus xylocaine	150	97.00±12.45			
DBP - 5 min after insertion of LMA/ Propofol	150	61.76±7.98	46.420	0.000	P< 0.01 (HS)
DBP -5 min after insertion of LMA/ Thiopental plus xylocaine	150	69.52±5.93			

DISCUSSION

Hemodynamic stability is very much important throughout induction of general anesthesia in surgical operations. Thus, anesthetic agent by way of minimum effect on heart rate (HR) and blood pressure (BP) would be the agent of choice for general anesthesia. Optimal balance of anesthesia is required during LMA insertion. Laryngeal Mask Airway (LMA) is a suitable device for maintaining airway managing in both adults and children either in elective or emergency surgeries. Even and winning insertion of LMA needs sufficient mouth opening with covered up the upper airway reflexes to evade gagging, coughing and laryngospasm. Despite the popularity of LMA for general anesthesia, the most advantageous induction agent that guarantees excellent insertion situations while maintaining cardiovascular stability has not been found. The largest parts of anesthesiologists utilize propofol for LMA anesthesia, as this agent best obtunds upper airway or oropharyngeal reflexes [25].

The present study has findings that reveal statistically that there is insignificant differences ($p<0.01$) for the hemodynamic parameter (heart rate (HR)) between the propofol group and thiopentone_lidocaine group at pre induction interval and there are significant differences ($p<0.01$) for induction, at LMA insertion and 5min after LMA insertion between the studying groups, cardiovascular dispiriting possessions of propofol may be realized to direct myocardial indentation of declined systemic vascular resistance. Also, propofol converts the baroreflex mechanism, attending in a slighter progress in H.R for definite deduce in arterial pressure (26). For the hemodynamic parameter (respiratory rate (R.R)), the results show that there are no significant differences ($p<0.01$) at pre induction, induction and at LMA insertion, while, there is significant increasing ($p<0.01$) at 5 min after LMA insertion time interval between the two studying groups. During the comparison between the two studying groups, the results find that there insignificant increasing differences ($p<0.01$) for oxygen saturation (SpO_2).

As a hemodynamic parameter through studying time intervals (pre induction, at induction, at insertion and 5min after LMA insertion, the results of the systolic blood pressure (SBP) observe that there is highly significant differences ($p<0.01$) between the two studying groups through all studying time intervals. Also, the results of the diastolic blood pressure (DBP) find that there are significant differences at

$p < 0.01$ during pre induction and at induction time intervals, while, the differences were increase significantly ($p < 0.01$) at insertion and 5min after LMA insertion between the two studying groups. Reduced myocardial contractility and decreased systemic vascular resistance could be the reason for decrease in blood pressure (28, 29).

These hemodynamic changes are due to combined effects to the induction drug and use of Laryngeal mask airway (21). The laryngeal mask airway (LMA) provides a securing of airway patency without any pressure trauma to the gums or other soft tissues, it devoid such complications. In addition, its insertion not required laryngoscope, the life saving may be supported by laryngeal mask airway (LMA) (1). The current study is an attempt to get the best induction agent for LMA insertion which can conserve hemodynamic stability (25). Our results agree with the results that obtain by Gauchan.S.etal.(2011)and Rokesh K.and Savita C.(2017).

Conclusion:

We conclude, the current study reveals that at the dose of 2.5mg/kg of propofol is more valuable than at the dose of 5mg/kg of thiopentone as an induction agent for insertion of LMA.

Recommendation :

- We recommended do more research with larger number of cases to ensure the results of our study.
- Using propofol is recommended as I. anesthesia agent for induction for LMA insertion.

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