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COMPARING THE USE OF PROPOFOL AND THIOPENTAL AND THEIR ADMIXTUREFOR LARYNGEAL MASK AIRWAY (LMA) INSERTION

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Abstract

Introduction and purpose: Propofol and thiopental are two common medications used for anesthesia induction with different pharmacologic and pharmacodynamic effects. The purpose of this study is to compare the effect of propofol and thiopental and their admixture on hemodynamic status and ease of LMA insertion.

Methodology: This study was performed on 138 non-emergency patients. Samples were randomly divided into three 46-member groups who received propofol solution, propofol and thiopental admixture and thiopental solution. Next, the above admixtures were randomly injected. During the first 30 seconds, each patient was ventilated and then LMA insertion was performed. Patients' reaction to the occurrence or non-occurrence of the gagreflex, coughing, limb and head movement and laryngospasm were registered.

Heart rate and blood pressure in patients before induction, immediately after injection and then with 2 minute intervals until the restart of breathing were registered.

Results: There was a remarkable difference in patient reaction after LMA insertionin the propofol and thiopental admixture group. There was a significant statistical difference between the three groups in terms of limb and head movement ($P \leq 0.002$), coughing ($P \leq 0.033$), the gag reflex ($P < 0.0001$) and laryngospasm (Pvalue<0.0001), with the propofol and thiopental admixture group having the smallest value.

There were significant statistical differences in terms of changes in systolic and diastolic blood pressure($P \leq 0.05$), but no remarkable difference existed in terms of changes in heart rate($P > 0.05$).

Conclusion: The effects created on hemodynamics, patient reaction after LMAinsertion and other reactions during anesthesia in the propofol and thiopental admixture group were lower and it provides better conditions in anesthesia with an LMA.

Keywords: laryngeal mask, propofol, thiopental, hemodynamic changes

Introduction: Induction of general anesthesia in adult patients is often performed via the intravenous administration of drugs (propofol, thiopental, etomidate) that cause rapid anesthesia induction. After anesthesia, the anesthesiologistmay insert an LMA and or perform an intravenous administration of neuromuscular blockers to create skeletal muscle relaxation to facilitate direct laryngoscopy before endo tracheal intubation (1). Different studies have shown that the use of a laryngeal mask causes fewer side effects (e.g. stridor, breath holding, laryngeal spasm, arterial oxygen desaturation) during recovery (2&3).

Propofol is the most common medication administrated for anesthesia induction which is used as a continuous intravenous infusion and is also used in anesthesia with an LMA. Context-sensitive half-time of propofol is short even after its long infusion, and it causes a quick recovery (4). But compared to equi-anesthetic doses of other inducing drugs, it causes the most significant decrease in systemic blood pressure which can be attributed to the severe dilation of the arteries(4, 5, 6 and 7).

Also, propofol is a strong respiratory depression and causes more decrease in upper airway reflexes compared to thiopental which makes it more suitable for some airway instrumentations such as LMA insertion. Of barbiturates used for the induction of anesthesia to mention are thiopental and methohexital. Although, thiopental is metabolized slowly and has a long elimination half-life, but the recovery after the administration of a bolus dose is similar to that of methohexital and propofol (4). Barbiturates administration for anesthesia induction usually causes a relatively small drop in the systemic blood pressure which is lower than the amount created by propofol (4, 9, 10, 11 and 12). Barbiturates cause respiratory depression.

Laryngeal reflexes and coughing reflex via barbiturates are not depressed as much as when propofol would be administrated which makes barbiturates become a less attractive option for LMA when there are no neuromuscular blocking agents available (4, 13, 14 and 15).Considering what have been mentioned about the uses and mechanism of the effect of propofol and thiopental and since there are no restrictions written in reference books on the simultaneous use of these two medications (18) and most importantly, the presence of various contradicting studies about the effect of propofol and thiopental on blood pressure and facilitation of laryngeal mask insertion, in this study, by comparing

the use of propofol and thiopental and their admixture which causes a decreased concentration in both medications, the effects created on hemodynamics and ease of LMA insertion, were investigated.

Materials and methods

This was an interventional study and a clinical trial. Patients volunteering for surgery were randomly divided into three 46-member groups and compared.

For the qualitative variables in this study, the chi-squared test, and for the quantitative variables, the following tests were used: ANOVA, The Kruskal–Wallis test and Mann–Whitney U test.

In one group, propofol solution was used alone and in the second group, propofol and thiopental admixture was used (with ratios of 0.5% and 1.25% respectively), and in the third group, thiopental with a concentration of 2.5% was used. The vials used by the propofol were made by Teda Company and the thiopental was made by KWALITY, PHARMACEUTICALS. PVT. LTD. The propofol included 1% propofol equivalent to 10mg of propofol per cc and the propofol and thiopental admixture contained 5mg of propofol and 12.5mg of thiopental per cc and thiopental solution contains 25mg per cc and in all the groups, 0.25ml/kg of the above admixtures were injected, also, the medications were randomly selected and injected to the patients. During the first thirty seconds, each patient was ventilated and then LMA insertion was performed. The laryngeal masks that we used in this center were made by Canack Technology Ltd. Patients' reaction to the occurrence or non-occurrence of the gag reflex, coughing, limb and head movement and laryngospasm were registered. Mild reaction refers to cases which during the 30 seconds after the insertion, the reaction is eliminated. Medium reaction refers to cases which the patient requires a new dose of the anesthesia induction drug. Severe reaction refers to cases which the patient requires 25mg of succinylcholine for proper ventilation and oxygenation. Heart rate and blood pressure in patients before induction, immediately after injection and then with 2 minute intervals until the restart of breathing were registered. The results were analyzed using SPSS.

This clinical trial was registered in Iranian Registry of Clinical Trial (IRCT2015011512642N11)

Results

This study was performed on 138 patients (three 46-member groups) to compare the use of propofol and thiopental and their admixture for LMA insertion. 99 patients were male (71.7%) and 39 were female (28.3%) and their average age was 38.22±14.069. The minimum and maximum ages were 16 and 85 respectively. Their average weight was 69.72±11.845. The minimum and maximum weights were 35 and 95kg, respectively.

According to the results of the analysis of variance (Pvalue=1), no significant statistical differences in terms of gender, age and weight existed between the 3 groups. Investigation of patient reaction after LMA insertion showed that there is a significant statistical difference between the three groups (Pvalue<0.0001).

The admixture group, showed the best performance, followed by propofol and thiopental groups respectively (diagram 1). Concerning the comparison of head and limb movement, coughing, the gag reflex and laryngospasm, a significant statistical difference was observed between the three groups (P value≤0.002, P value≤0.002, P value<0.0001, Pvalue≤0.0001).

The thiopental group had the highest amount of head and limb movement, and in the propofol and thiopental admixture group, the least amount of head and limb movement occurred (table 1). The propofol group had the highest amount of the occurrence of coughing and in the propofol and thiopental admixture group, the least amount of the occurrence of coughing was observed (table 1).

The prevalence of the gag reflex in the thiopental and propofol admixture was less than that of the propofol group, and in the propofol group it was less than in the thiopental group(table 1), and the best efficiency belonged to the thiopental and propofol admixture group, and after that, the propofol had the best result (table 1). In investigating changes in heart rate, before and after anesthesia induction and in 2 minute intervals until the restart of breathing, the results of the Kruskal–Wallis test, suggested no significant statistical difference between the three groups (Pvalue>0.05).Therefore, between changes in heart rate before and after anesthesia induction and in 2 minute intervals until the restart of breathing, no difference was observed between the three groups (diagram 2).

In investigating the process of changes in systolic blood pressure before and after the induction of anesthesia and in two minute intervals until the restart of breathing, the results from the Kruskal–Wallis test suggested significant statistical differences between the three groups at all times except for time 0 (Pvalue≤0.05) which given the results, the systolic blood pressure changes before and after anesthesia induction and in two minute intervals until the restart of breathing in the propofol and thiopental admixture group were lower than those of the propofol group and in the propofol group, they were less than that of the thiopental group (diagram 3).

In investigating the process of diastolic blood pressure changes before and after anesthesia induction and in 2-minute intervals until the restart of breathing, it was observed that there is a significant difference in all the levels between these three groups (Pvalue≤0.05), and in the propofol and thiopental admixture group and in the propofol group, it was reported as being less (diagram 4).

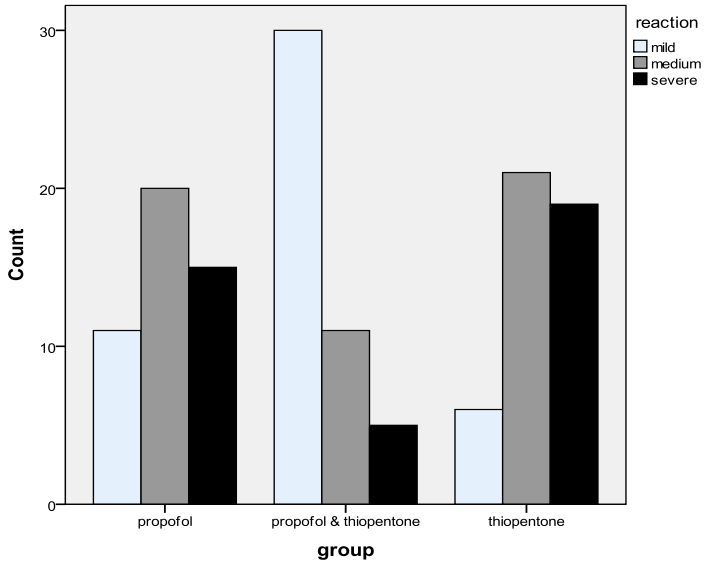

Diagram 1: Investigating patient reaction after LMA insertion between the three groups.

Table-1: Prevalence of limb and head movement, coughing, the gag reflex and laryngospasm in the three groups.

	Propofol	Propofol and Thiopental admixture	Thiopental
Prevalence of limb and head movement	23.9%	21.3%	52.2%
Prevalence coughing	56.5%	37%	52.2%
Prevalence of the gag reflex	58.7%	23.9%	76.1%
Prevalence of laryngospasm	10.9%	6.5%	41.3%

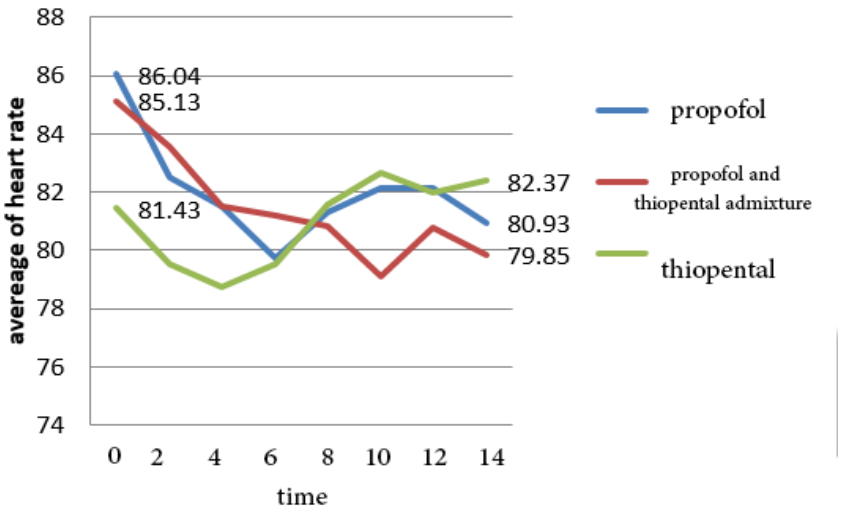

Diagram 2: Changes in heart rate before and after anesthesia induction and in 2-minute intervals until the restart of breathing between the three groups.

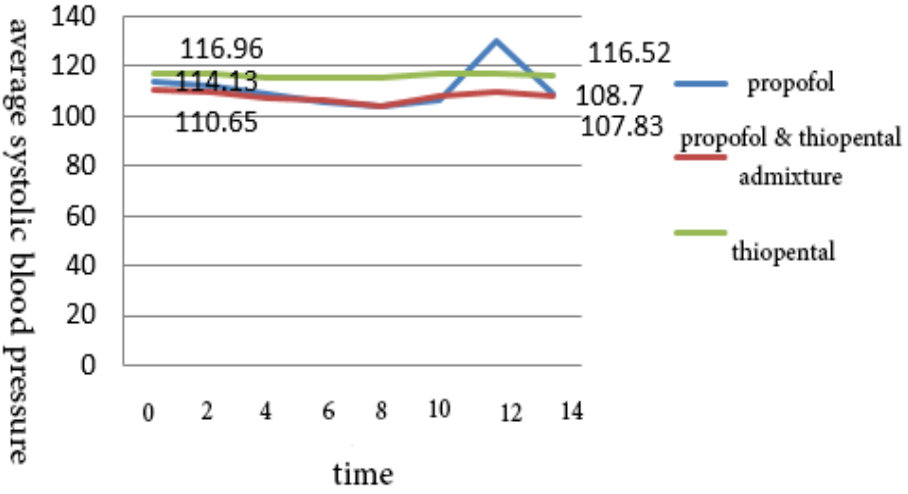

Diagram 3: Systolic blood pressure before and after anesthesia induction and in 2-minute intervals until the restart of breathing between the three groups.

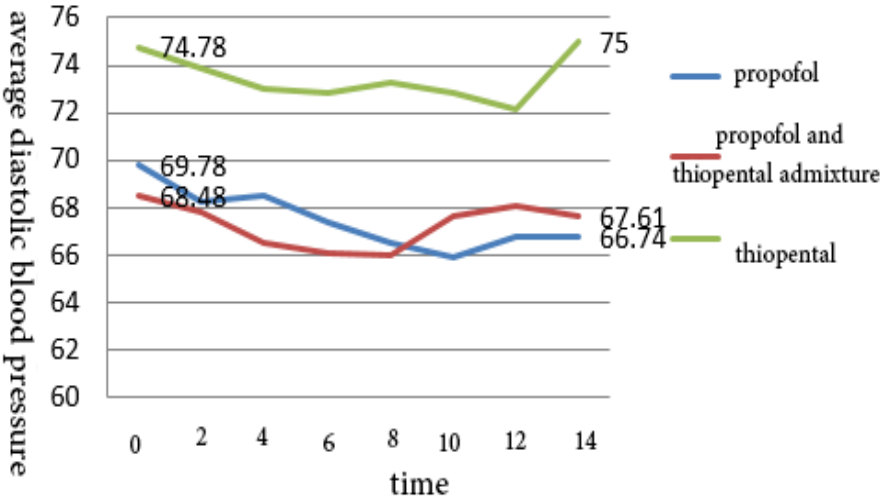

Diagram 4: Diastolic blood pressure before and after anesthesia induction and in 2-minute intervals until the restart of breathing between the three groups.

Conclusion

Investigation of patients' reaction after LMA insertion showed that the admixture group had the best performance, followed by the propofol and subsequently the thiopental groups. These results are in agreement with the result of Bugove L. et al. (1995). In that study, the easy of LMA use in the group who received propofol was much better than that of the thiopental group (7), but in the Bugove L's study, propofol and thiopental admixture was not examined. In investigating the prevalence of limb and head movement, in the present study, the greatest amount of limb and head movement belonged to the thiopental group while the admixture group and the propofol group showed the least amount of limb and head movement. These results are in agreement with the observations of Scanlon P et al. (1993), because in their study, in comparing the effect of propofol and thiopental relative to patients' reaction to the LMA,

after the induction of anesthesia, limb and head movement was higher in the thiopental group compared to the propofol group (1).

Concerning the prevalence of coughing, the greatest amount of coughing was in the propofol group and in the admixture group, the least amount of coughing was observed. But the results of this section are not in agreement with the result of the study of Scanlon P et al. regarding the prevalence of coughing, because in this study, the prevalence of the occurrence of coughing was reported to be more in the thiopental group compared to the propofol group, and this contrast may be due to the use of a lower dose of thiopental in the study of Scanlon P et al. (1).

In investigating the prevalence of the gag reflex, there was a significant statistical difference between the three groups, such that the greatest prevalence of the gag reflex belonged to the thiopental group and the least prevalence was in the admixture group. In the study of Scanlon P et al. also, the prevalence of the gag reflex in the thiopental group was more compared to the propofol group (1). But in Onsiong Mk et al. (2001)performed on the comparison of thiopental with propofol admixture and propofol in anesthesia with LMA, no significant difference existed in terms of the gag reflex between the two groups (17). The reason for these different results may be due the synergic effect of propofol and fentanyl in our study which causes increased gag reflex in the propofol group compared to the admixture group, or may be due to the fewer number of patients in Onsiong Mk's study. In investigation of the prevalence of laryngospasms, the best efficiency belonged to the thiopental and propofol admixture followed by propofol. In the study of Scanlon P et al. also the prevalence of laryngospasm in the thiopental group was greater than that of the propofol group (7), but in the study of Onsiong Mk et al. the prevalence of laryngospasm between the admixture group and the propofol group, no significant difference existed (16). Investigation of the process of heart rate changes before and after anesthesia induction and in 2-minute intervals until the restart of breathing showed that in this relationship between propofol, admixture and thiopental, no difference exists. In a study performed by Bugove L et al. in 1995, also the changes in heart rate between the propofol and thiopental group showed little change (7). In investigating the comparison between systolic and diastolic blood pressure changes before and after induction of anesthesia and in 2-minute intervals until the restart of breathing, it was shown that the admixture group is superior to the individual groups of propofol and thiopental groups. It must be mentioned that between the propofol and admixture groups, there was no significant statistical difference in terms of diastolic blood pressure. In Bugove L et al.'s study, also, a remarkable yet passive increase in systolic and diastolic blood pressure in the thiopental group was observed, but no remarkable reaction was seen in the propofol group (16). In the study performed by Onsiong Mk et

al. also the prevalence of the drop in blood pressure in the admixture group compared to the group which only received propofol was lower, but thiopental was not compared alone (16). In a study performed by Renu shinha et al. in 2010 on 5 to 15 year old children for the comparison of thiopental and propofol admixture and propofol in anesthesia with LMA, it was concluded that thiopental and propofol admixture was both cheaper and safer (17). The present study also shows that thiopental and propofol admixture is safer and provides more suitable condition. In the present study it was discovered that patient reaction after LMA insertion, changes in blood pressure and other reactions during anesthesia in the thiopental and propofol admixture group were lower, and this admixture provides better conditions at anesthesia with LMA. Also, the thiopental and propofol admixture is more cost-efficient. At the end, given the research gap in this area, it is recommended that this comparison be made in younger age groups and it is better to study a larger statistical population which causes more statistical difference between the groups.

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References:

1. Scanlon P, Carey M, Kirby F. Patient response to laryngeal mask insertion after induction of anaesthesia with propofol or thiopentone. Can J Anaesth 1993 Sep; 40(9): 816-8.
2. Alishiri A, Naderi M, Jadidi Kh, Nouranian V, Bolouki Moghaddam. Comparing the effect of laryngeal mask airway and Endotracheal tube insertion on Intraocular pressure. Journal of Mazandaran University of medical Sciences 1389.
3. Watts P, Lim MK, Gandhewar R, mukhrejee A, Wintle A, Armstrong T,etal. The effect of laryngeal mask airway insertion on intraocular pressure measurement in children receiving general Anaesthesia. Am J ophtalmol 2007; 144(4): 507-510.
4. Miller text book of Anaesthesia.
5. Schluzen L, Juul N, Hansen KU, Cold GE. Regional cerebral blood flow and glucose metabolism during propofol anaesthesia in healthing subject studied with positron emission tomography. Acta Anaesthesia Scand. 2012Feb ;56(2):248-550.
6. Blake DW, Dawson P, Donnan G, Bjorksten A. Propofol induction for laryngeal mask airway insertion: dose requirement and cardiorespiratory effects. Anaesth Intensive Care. 1992Nov; 20(4): 479-83.

7. Acalovschi I, Miclescu A, Bugovl. The effects of propofol on laryngeal reactivity and the haemodynamic response to laryngeal mask insertion. Eur J Anaesthesiol. 1995Jul; 12(4):351-6.

8. Roopam Kataria, Ajay Singhal, Sukirti Prakesh, Ishwar Singh. A comparativstudy of efficacy of propofol propofol aut-co-induction versus midazolam propofol co-induction using the priming principle. Indian journal of Anaesthesial 2010Nov-Dec; 54: 558-61.

9. Lee TW, Loewenthal AE, Stranchan JA, Todd BD. Pain during injection of propofol , the effect of prior administration of thiopentone. Anaesthesia 1994; 49: 817-8.

10. Gauss A, Heinrich H, Wilder-Smith OH. Echocardiographic assessment of a haemodynamic effects of propofol a comparison with etomidate and thiopenton. Anaesthesia 1991; 46: 99-105.

11. Garood M, Fillery Travis A.J, Rich G.T. Thiopentone and propofol: a Compatible mixture? European Journal of Anaesthesiology: July 1998-volum15-Issue 4-pp409-413.

12. Edvard R, Donald T, Yun K, Jiri Hrazdil, Soheir R, Alexander S. propofol and thiopental in a 1:1 Volum Mixture Is Chemically Stable. Anaesth Analg 1998; 86: 422-6.

13. Shribman AJ, Smith G, Achola KJ. Cardiovascular and cathecolamin responses to laryngoscopy with and without intubation.Br J Anaesth 19 87; 59: 225-299.

14. Minoda Y, Yoshimin K, Kawaguchi Y, Nagata E, Sakamoto M, Takehara A. vocal cord palsy after the use of a laryngeal mask airway.Masui.2003Mar; 52(3):291-3.

15. Uchida S, Kuroda M, Saito S. Coronary artery spasm immediately after insertion of a laryngeal mask airway during induction of general anaesthesia. Masui.2011Oct; 60(10): 1180-4..

16. Yeo KS, Kua SW, Teoh GS, Onsiong MK. The use of thiopenton / propofol admixture for laryngeal mask airway insertion.Anaesth Intensive Care. 2001Feb; 29(1): 38-42.

17. Renu Sinha, Dilip Shende, Rakesh Garg. Comparison of propofol(1%) with admixture (1:1) of thiopenton (1.25%) and propofol (0.5%) for laryngeal mask airway insertion in children undergoing elective eye surgery: Double masked randomized clinical trial. Indian journal of anaesthesia 2010Mar-Apr; 54: 104-8.

18. Drug hypersensitivity Werner J.Pichler2007.

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