Original article:

Comparative study of etomidate- lipuro and propofol for induction in general anaesthesia

Dr Ameesha Sharma[1],Dr Kalpana Kulkarni[2], Dr I J Namazi[3] , Dr Mrs Rashmee Chavan[4]

2 – Professor & Head of department of department, 3 – Professor of the department , 4 – Associate Professor of the department , 1 – 3 rd year PG student of the department.

Department of Anesthesia, P. Dr D Y Patil Medical College, Kolhapur, Maharashtra, India

Corresponding author: Dr Ameesha Sharma

Abstract:

An ideal induction agent for general anesthesia should have hemodynamic stability,minimal respiratory side effects and rapid clearance. Sudden hypotension has a deleterious effects on maintaining the circulation to vital organs. Presently etomidate and propofol are popular rapid acting inducing agents. Double blind randomized study was conducted on sixty patients after informed consent, comprising of thirty patients each. Both received fentanyl 2 microgm/kg and glycopyrrolate 0.2 mg as premedication ten minutes before induction,followed by etomidate 0.3 mg/kg given slowly over 45 seconds in the first group and propofol 2. mg/kg for induction of anaesthesia in the second group. Statistical evaluation between the groups showed that the decrease in MHR observed in both groups was statistically significant ($p<0.05$).The decrease in SBP in Group P was statistically significant compared to decrease in SBP in Group E ($p < 0.02$) at third minute and remained significant even up to 10 minute post intubation. Statistical evaluation between the groups showed that the decrease in DBP observed in both groups was statistically significant ($p <0.05$) for basal, 3 min, 5 and 10 min. Statistical evaluation between the groups showed that the MAP observed in both groups was statistically not significant ($p>0.05$) and was only significant for basal values. And propofol caused more of myoclonus than etomidate lipuro. There was no significant difference with regard to nausea and vomiting between the two groups.

Keywords- Etomidate, Propofol

Introduction

Inducing agents are drugs that, are given intravenously in an appropriate dose, cause rapid loss of consciousness[3]. Induction agents are used to induce anaesthesia prior to other drugs being given to maintain anaesthesia , as the sole drug for short procedures, to maintain anaesthesia for longer procedures by intravenous infusion , to provide conscious sedation during procedures undergoing in local anaesthesia and intensive care unit[6]. An ideal induction agent for general anesthesia should have hemodynamic stability, minimal respiratory side effects and rapid clearance and with minimal side effects and drug interaction[7]. Presently Etomidate and Propofol are popular rapid acting inducing agents.

Etomidate is a carboxylate imidazole-containing compound characterized by hemodynamic stability, minimal respiratory depression and cerebral protective effects[1]. Its lack of effect of sympathetic nervous system, baroreceptor reflex regulatory system[1,2] and its effect of increased coronary perfusion even on patients with moderate cardiac dysfunction makes it an induction agent of choice. Propofol decreases blood pressure, cardiac output and systemic vascular resistance[3,4] due to inhibition of sympathetic vasoconstriction and impairment of baroreceptor reflex regulatory system[1,5].

This study is an attempt to compare hemodynamic, respiratory and other effects of both the drugs so that we can choose a safe induction agent.

Materials and methods

This study is used as singlecentre prospective, randomized, double blind controlled design. Patients are evaluated for surgery and informed valid written consent is taken. Informed consent is taken prior to the study. 60 patients are selected based on inclusion criteria and are randomly divided into two groups.

Group E:-Induction with etomidate lipuro (n =30)

Group P:-Induction with propofol (n = 30) Patients would be informed about the known effects and side effects of the drug and consent is taken for the study.

On arrival to operation room –

1) IV line will be secured.
2) Monitors for Electrocardiogram, EtCO2, Pulse rate, Non Invasive Blood Pressure and SPO2 will be connected Oxygen delivered via face mask 6 litre /nasal prongs 2 litre.
3) Baseline heart rate , systolic blood pressure, diastolic blood pressure and mean arterial pressure is recorded.

Premedication :Inj. Ranitidine 1.25 mg/kg iv

Inj.Ondansetron 0.08 – 0.1 mg/kg,iv

Inj. Glycopylorate 0.004 mg/kgiv

Patients are premedicated and inj fentanyl 2mcg/kg iv and inj midazolam 0.05mg/kg iv iv is given 10 minutes before induction.Induction of anesthesia is either with Propofol 2 mg/kg or Etomidate lipuro 0.3mg/kg, loss of eye lash reflex is considered to be the end point. Mask ventilation is checked followed by Inj scoline 2mg/kg iv used for intubation, after the intubation is confirmed patient is connected to Bain s circuit and intermittent positive pressure ventilation is continued until the completion of surgery with 66% N2O in O2 along with inhalational agent sevoflurane / isoflurane supplemented with intravenous vecuronium 0.08-0.1mg/kg iv. Intubation is performed by senior resident. After intubation, haemodynamic parameters will be recorded at induction , 3 minute , 5 minute and 10 minute reading of heart rate , systolic blood pressure, diastolic blood pressure and mean arterial blood pressure are recorded.

Observation is made for presence of any MYOCLONUS and is graded as

Grade 0 – No

Grade 1 – short movement of body segment eg finger or sholuder

Grade 2 – slight movement of different muscles or muscle group of body (eg face and leg).

Grade 3- intense clonic movement in two or more group of muscles (fast abduction of limb).

Injection on pain is graded as:

Grade 0 – No pain

Grade 1- Verbal complain of pain.

Grade 2 – Withdrawal of arm.

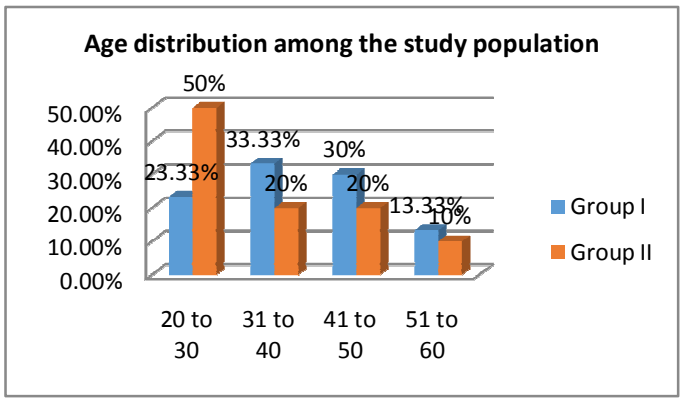
Grade 3 – Both verbal complain and withdrawal of arm.

At the end of surgery, neuro muscular blockade is reversed by using

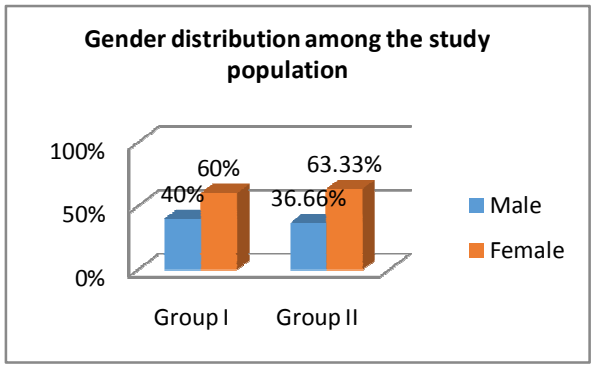
Intravenous neostigmine0.04mg/kg iv and glycopyrolate 0.008mg/kg iv.The extubation is performed after the patient is fully awake. The patient is monitored 24 hours for post operative nausea and vomiting at 1, 6 and 24 hour.

www.ijbamr.com P ISSN: 2250-284X , E ISSN : 2250-2858

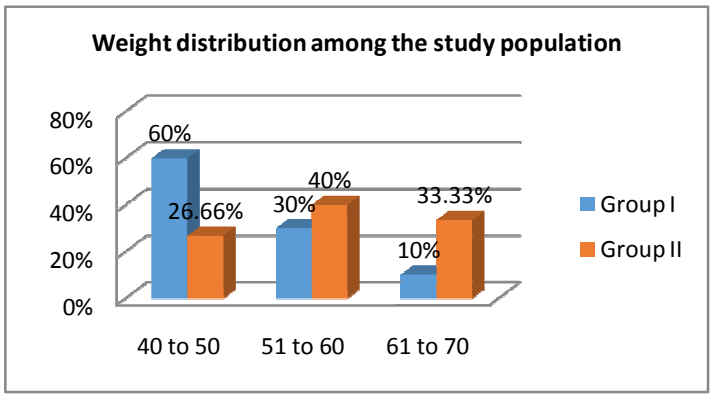
Results:



The age distribution among the study population where in Group E majority of the patients were in the age group 20 to 40 years and in Group P majority were in age group 20 to 40 years.

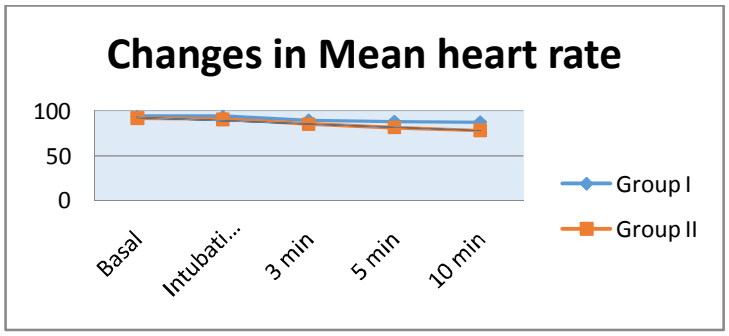


Gender distribution among the study population, where among both the groups females were more than males

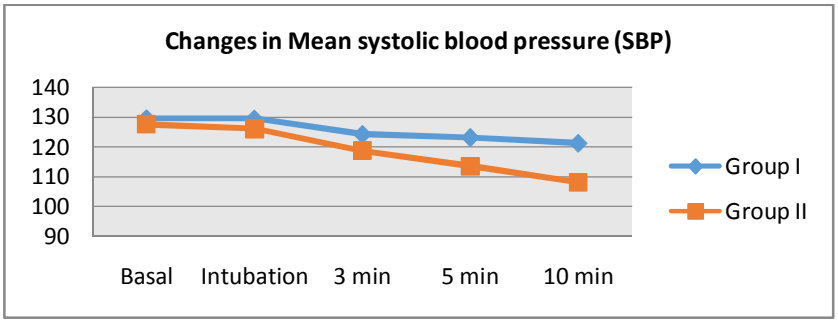


Group E majority i.e. 90% of patients had their weight in range of 40 to 60 kg.

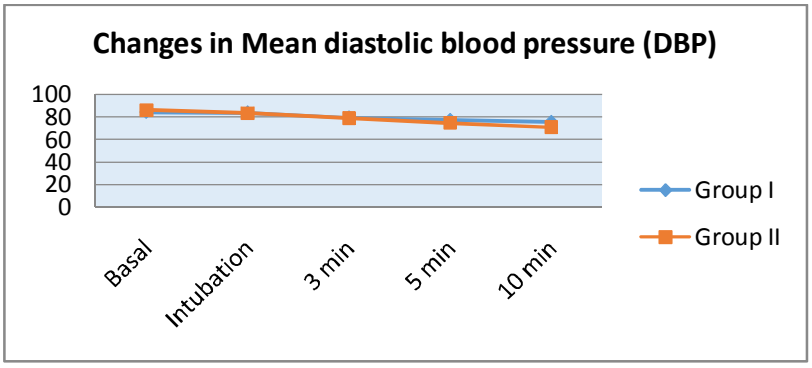
Among Group P patients majority 70% were in range of 40 to 60 kg.



The changes in Mean heart rate, where it was seen that among Group E patients the basal MHR in beats per minutes was 93.9, followed by 93.7 at intubation and it was 89.6 at 3min, 88.2 in 5 min and 87.4 in 10 min.And among Group P patients the basal MHR in beats per minutes was 92.1, followed by 90.5 at intubation and it was 85.6 at 3min, 81.4 in 5 min and 78.2 in 10 min.Statistical evaluation between the groups showed that the decrease in MHR observed in both groups was statistically significant ($p<0.05$). Fall in heart rate is more in group p.

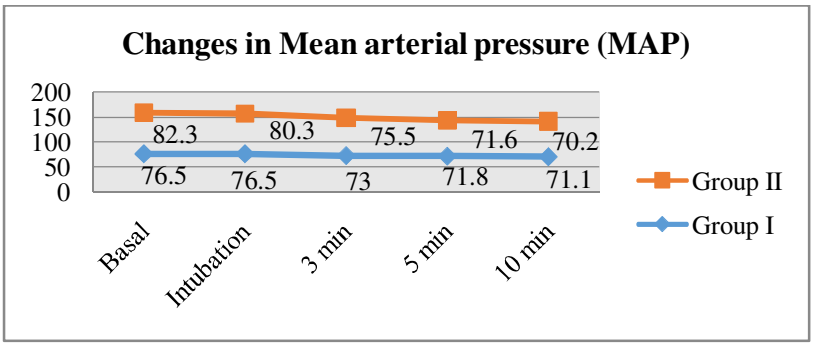


The decrease in SBP in Group P was statistically significant compared to decrease in SBP in Group E ($p < 0.02$) at third minute and remained significant even up to 10 minute post intubation.

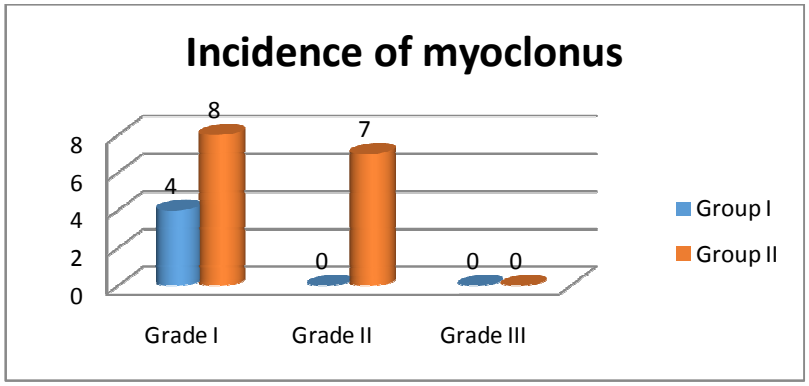


Statistical evaluation between the groups showed that the decrease in DBP observed in both groups was statistically significant ($p <0.05$) for basal, post intubation at 5 and 10 min.

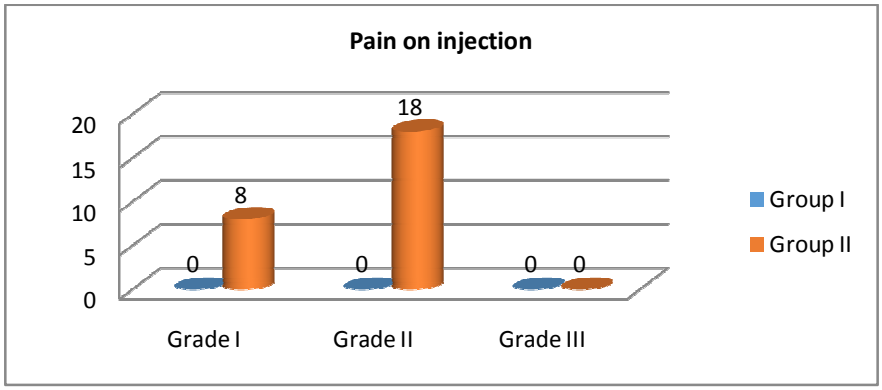
www.ijbamr.com P ISSN: 2250-284X , E ISSN : 2250-2858



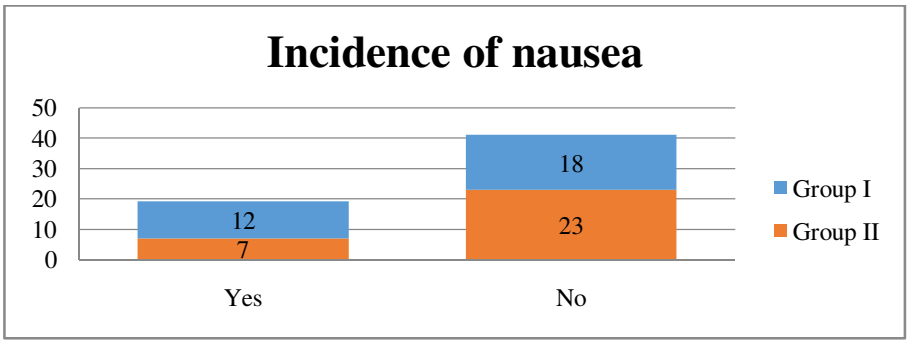
Statistical evaluation between the groups showed that the MAP observed in both groups was statistically not significant (p>0.05) and was only significant for basal values.



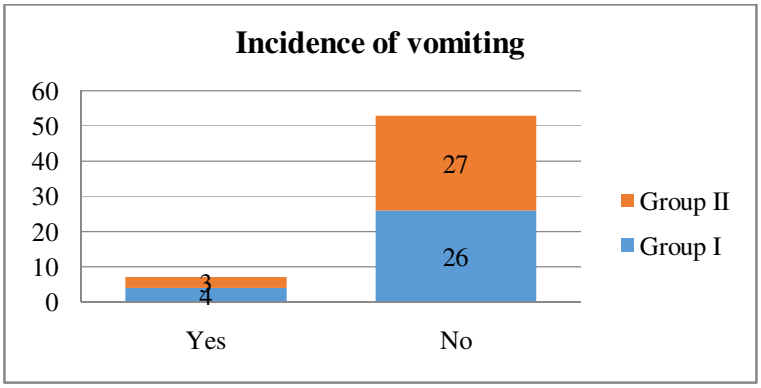
The incidence of myoclonus among study population, where it was seen that among Group E patients 4 showed grade I And among Group P, 8 showed grade I and 7 showed grade II. P value=0.04, which shows significance.



Pain on injection, where it was seen that among Group E patients no patient had pain on injection. And among Group P patients 8 had grade I pain and 18 had grade II pain.Pvlaue =<0.0001, which shows significance.



The incidence of nausea, where Group E patients 12 had nausea as compared to 7 in Group P. P value= 0.08, which shows no significance.



The incidence of vomiting, where Group E showed more incidence of vomiting than Group P. P value= 0.34, which shows no significance.

Discussion:

We have studied 60 patients of both sexes between 20- 60 years of age posted for elective surgeries .Present study shows the age distribution among the study population where in Group E majority of the patients were in the age group 20 to 40 years.In Group P majority were in age group 20 to 40 years.Mean age was for Group E was 38.2+ 11.04.Mean age was for Group P was 33.46+ 11.27.A study by Ramesha K N showed that Group E had majority 38% patients in the age group of20 to 30 years, whereas majority 32.5% in Group P were in age group 41 to 50 years[9]. Gender distribution among the study population, where among both the groups females were more than males.A study by Ramesha K N showed that in both groups there was predominance of males[9].The weight distribution among the study population; where in Group E majority i.e. 60% of patients had their weight in range of 40 to 50 kg.Among Group P patients majority 40% were in range of 51 to 60 kg.A study by Ramesha K N showed that in Group E majority 45% patients were in range 51 to 60 kg and in Group P majority 55% were in a range 51 to 60 kg[9] . The changes in Mean heart rate, where it was seen that among Group E patients the basal MHR in beats per minutes was 93.9, followed by 93.7 at intubation and it was 89.6 at 3min, 88.2 in 5 min and 87.4 in 10 min.And among Group P patients the basal MHR in beats per minutes was 92.1, followed by 90.5 at intubation and it was 85.6 at 3min, 81.4 in 5 min and 78.2 in 10 min. Statistical evaluation between the groups showed that the decrease in MHR observed in both groups was statistically significant ($p<0.05$). A study by A.Crido et al studied hemodynamic characteristics of 36 patients on induction with etomidatelipuro

there was a reduction n cardiac output, stroke volume and arterial pressure and compensatory increase in heart rate[4]. The changes in Mean systolic blood pressure, where it was seen that among Group E patients the basal MSBP in mm of Hg was 129.5, followed by 129.4 at intubation and it was 124.2 at 3min, 123.1 in 5 min and 121.2 in 10 min.And among Group P patients the basal MSBP in mm of Hg was 127.6, followed by 126.1 at intubation and it was 118.7 at 3min, 113.6 in 5 min and 108.1 in 10 min.The decrease in SBP in Group P was statistically significant compared to decrease in SBP in Group E ($p < 0.02$) at third minute and remained significant even up to 10 minute post intubation.A study by A.Gauss (1991) noticed the change in SBP by1 mm Hg, DBP by 1mmHg with Etomidatelipuro and SBP decreased by13 mmHg, DBP by 4 mmHg in Propofol group. Present study shows the changes in Mean diastolic blood pressure, where it was seen that among Group E patients the basal MDBP in mm of Hg was 84.3, followed by 83.9 at intubation and it was 79.6 at 3min, 77.5 in 5 min and 75.8 in 10 min.And among Group P patients the basal MDBP in mm of Hg was 86.1, followed by 83.5 at intubation and it was 78.9 at 3min, 74.7 in 5 min and 71 in 10 min.Statistical evaluation between the groups showed that the decrease in DBP observed in both groups was statistically significant ($p <0.05$) for basal, post intubation at 5 and 10 min. Statistical evaluation between the groups showed that the MAP observed in both groups was statistically not significant ($p>0.05$) and was only significant for basal values.A study by J G Reves et al showed that the cardiovascular effects of propofol have been evaluated after its use for induction and for maintenance of anesthesia .The most prominent effect of propofol is a decrease in arterial blood pressure during induction of anesthesia.

Present study shows the incidence of myoclonus among study population, where it was seen that among Group E patients, 4 showed grade I myoclonus.And among Group P, 8 showed grade I and 7 showed grade II.A study by Mirakhur RK showed that Myoclonus occur but less frequently with propofol than after etomidate lipuro Present study shows the incidence of nausea, where Group E patients 12 had nausea as compared to 7 in Group P.In a double blind randomized study, M.Stpierre studied the incidence and severity of post-operative nausea and vomiting was investigated with etomidate-lipuro and propofol. They concluded that etomidatelipuro does not show increase incidence of nausea than propofol during early post-operative period.Group E showed more incidence of vomiting than Group P.In a double blind randomized study, M.Stpierre studied the incidence and severity of post-operative nausea and vomiting was investigated with etomidate-lipuro and propofol. They concluded that etomidate lipuro does not show increase incidence of vomiting than propofol during early post-operative period[8].

Conclusion

Patients induced with Propofol had significant decrease in systolic, diastolic blood pressure and mean arterial pressures at 10 minutes after induction compared to Etomidate lipuro. This characteristic indicates that Etomidate maintained hemodynamic stability. Heart rate changes were significant between the two groups. Incidence of pain on induction were more with Propofol group, and propofol caused more of myoclonus than etomidate lipuro. There was no significant difference with regard to nausea and vomiting between the two groups.

So, Etomidate lipuro is better inducing agent than propofol with regard to cardiovascular stability.

www.ijbamr.com P ISSN: 2250-284X , E ISSN : 2250-2858

Acknowledgement:

I am proud to express my sincere gratitude and sincere thanks to to Dr. (Mrs.). K. R. Kulkarni , Dr. I. J. NAMAZI and Dr. Rashmee Chavan for their help and guidance during my study.

References

1 Stoelting Robert and Simon C.Hiller. Pharmacology and Physiology in Anesthetic practice. 4th edition. Philadelphia: Lippincott Williams and Wilkins publishers.,2006,159-160.

2 Guyton, Arthur C, Hall, John. Guyton and Hall Textbook of Medical Physiology. 10th ed. Philadelphia: Elsevier Saunders; 2006.

3. William F Ganong, Kim E Barrett. Ganong Review of Medical Physiology. 22nd ed. Newyork: McGraw-Hill Medical; 2005.

4. Criado A, Maseda J, Navarro E, et al. Induction of anaesthesia with etomidate: Haemodynamic study of 36 patients. British Journal ofAnaesthesia1980; 52:803-806.

5. .J. G. Reves, Peter Glass, David A. Lubarsky. In: Ronald D Miller, editors. Miller's Anesthesia. 7th ed. Philadelphia: Churchill LivingstoneElsevier; 2005. P.719-769.

6. Yushi U. Adachi, Maiko Sotomoto, Hideyuki Higuchi et al. Fentanyl attenuates the hemodynamic response to Endotracheal Intubation more than the response to Laryngoscopy. Anaesthesia Analgesia 2002;95:233-7.

7.Doenicke A, Roizen MF, Nebauer AE, et al. A comparison of two formulations for etomidate, 2-hydroxypropyl-beta-cyclodextrin (HPCD) and propylene glycol. Anaesthesia Analgesia 1994; 79:933-939.

8. M. St Pierre. et. al. Does etomidate increase post operative nausea? A double blind controlled comparision of etomidate in lipid emulsion with propofol for balanced anaesthesia. European Journal of anaesthesiology 2000;7:1-9.

9. Ramesha K.N, Comparative Study OfEtomidate And Propofol For Induction Of General Anaesthesia.2012.

.10. Veroli P, O'Kelly B, Bertrand F, et al. Extrahepatic metabolism of propofol in man during the anhepatic phase of orthotopic liver transplantation. British Journal of Anaesthesia1992; 68:183-186.

11.Kirkpatrick T, Cockshott ID, Douglas EJ, Nimmo WS. Pharmacokinetics of propofol (diprivan) in elderly patients. British Journal ofAnaesthesia1988; 60:146-150.

12. A. Gauss, H. Heinrichand H. G. Wilder-Smith. Echocardiographic assessment of the haemodynamic effects of Propofol : a comparison with etomidate and thiopentone. Anaesthesia1991;46:99-105.

13. Duthie DJ, Fraser R, Nimmo WS. Effect of induction of anaesthesia with etomidate on corticosteroid synthesis in man. British Journal ofAnaesthesia1985; 57:156-159. 68

14. Ozgul U, Begec Z, Erdogan MA, et al. Effect of alkalinisation of lignocaine for propofol injection pain: a prospective, randomised, double-blind study. Anaesth Intensive Care. 2013;4:501---4.

15. MehradMasoudifar, ElhamBeheshtian. Comparison of cardiovascular response to laryngoscopy and tracheal intubation after induction of anesthesia by Propofol and Etomidate; J Res Med Sci 2013 Oct; v 18(10): 870 – 874.

16. ShivaprakashShivanna, ShioPriye, SathyanarayanJagannath, ChandrashekarKadli, Mayuri, Vikas, Subash, Durgaprasad Reddy. A comparative study of haemodynamic effects of propofol and etomidate as an induction agent in coronory artery surgery; Journal of Evolution of Medical and Dental Sciences 2015; vol 4, issue 04, jan 15: 598-607.

17. Mousumi Das, Basantku Pradhan, Ramesh chSamantray. Comparative study on haemodynamic responses during intubation using etomidate, propofol and thiopentone in laparoscopic cholecystectomy surgeries; Innovative journal of Medical And Health Sciences 5: 4 July- Aug 2015.

18. Shagun Bhatia Shah**,** Itee Chowdhury**,** Ajay Kumar Bhargava**,** BhawnishSabbharwal. Comparison of hemodynamic effects of intravenous etomidate versus propofol during induction and intubation using entropy guided hypnosis levels. J AnaesthesiolClinPharmacol 2015; 31:180-5.