ORIGINAL RESEARCH PAPER

Anaesthesiology

KEY WORDS: LMA, Etomidate, Propofol, Haemodynamics.

# COMPARISON OF HAEMODYNAMIC EFFECTS OF ETOMIDATE AND PROPOFOL TO INSERTION OF SUPRAGLOTTIC DEVICE IN PATIENTS WITH LOW LEFT VENTRICULAR EJECTION FRACTION POSTED FOR LAPAROSCOPIC CHOLECYSTECTOMY UNDER GENERAL ANESTHESIA

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**ABSTRACT**

**Background-** Traditionally Etomidate is considered the most preferred induction agent in patients with cardiac ailments posted for elective surgeries under general anesthesia. **Aims**- Our study aims to compare haemodynamic fluctuations associated with induction and airway management with ProSeal-LMA in patients with mid to moderately low ejection fraction of 40-50% posted for laparoscopic cholecystectomy under general anaesthesia when Etmodate and Propofol are used . **Materials And Methods**- After institutional ethical approval and patient's written informed consent a randomized double blind study was conducted on 60 patients of either sex, 40 to 60 years age group with LVEF 40-50% posted for laparoscopic cholecystectomy under general anaesthesia. Patients were randomly divided into two groups of 30 patients each. Group P: received Propofol 2 mg/kg . Group E: received Etomidate 0.3mg/kg. After adequate pre oxygenation and pre medication with Inj Glycopyrollate (0.02 mg/kg) and Inj Fentanyl (2 mcg/kg) iv, Induction of anaesthesia was carried out according to the groups using Inj. Propofol 2mg/kg or Inj.Etomidate 0.3mg/kg and Inj. Cis-Atracurium 0.15 mg/kg was given as muscle relaxant and Pro Seal LMA was inserted. Vital parameters like heart rate, noninvasive blood pressure, respiratory rate and SpO2 were monitored throughout the surgical procedure. Patients were observed for ease of insertion, attempts and duration of Pro Seal-LMA insertion and haemodynamic response to Pro Seal-LMA insertion. **Observations And Results**- Etomidate is relatively more haemodynamically stable induction agent as compare to Propofol.

## INTRODUCTION:

For general anaesthesia, anaesthesiologist has to secure an airway and to provide adequate ventilation to the patient. Management of the airway has come a long way from endotracheal intubation to supra glottic devices [1,3].

Laryngoscopy and endotracheal intubation require skill and it is associated with reflex sympathetic stimulation. This response can be avoided if supralaryngeal airway devices are used[2,4]. ProSeal LMA reduces likelihood of throat irritation and stimulation and has a drain tube orifice for placement of ryle's tube, thereby decreasing gastric insufflation and post operative nausea and vomiting[5].

The haemodynamic fluctuations associated with induction and airway management are of particular importance with cardiac patients with systolic dysfunction. Hypotention and Bradycardia associated with cardio-depressant and sympatho-lytic nature of induction agents, though well tolerated by patients with robust physiological reserves; can be hazardous in patients with compromised cardiac function[1,3].

Traditionally Etomidate is the most preferred induction agent in patients with cardiac ailments[2]. Our study aims to compare haemo-dynamic fluctuations associated with administration of general anesthesia in patients with LVEF 40-50% posted for laparoscopic cholecystectomy.

## MATERIALS AND METHODS:

After institutional ethical committee approval and written informed consent, a study on 60 patients of either sex, in the age group 40-60 years was conducted on patients with moderately low LVEF 40-50% ousted for laparoscopic cholecystectomy.

It was a Randomized, Prospective and Double-Blind Comparative study. 60 patients were divided into two equal groups. Pre-operative evaluation was carried out a day before the surgery. A thorough history was taken, and a detailed examination carried out. Patients subjected to routine and relevant investigations. The procedure was explained to the patient and written informed consent taken. Patient was taken inside the operation theatre. ECG, SpO2, NIBP were applied. Baseline Pulse rate, Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Mean Arterial blood Pressure (MBP) and SpO2 were recorded. Intravenous line was secured, and patients were pre-medicated with Inj. Glycopyrrolate 0.004mg/kg IV and Inj.Ondansetron 0.15 mg/kg IV and Inj. Fentanyl 2 mcg/kg. The patients were pre-oxygenated for 3 mins using 100% oxygen.

Group P received Propofol 2 mg/kg Group E received Etomidate 0.3mg/kg. Induction was carried out according to the groups using Inj. Propofol 2 mg/kg or Inj.Etomidate 0.3mg/kg. Inj. Cis- Atracurium 0.15 mg/kg was given as muscle relaxant and Pro Seal LMA was inserted. Proper placement of device checked by 1) With IPPV-Chest Expansion 2) No Major Leak 3)No gastric insufflation 4) EtCO2 wave forms 5)SpO2.

Ease of insertion, Number of insertion attempts, Each attempt duration(time from picking up the device until attaching it to the breathing system in minutes), Failed attempts (removal of device from mouth before reinsertion with or without change of device, Manipulation required (gentle pushing/pulling/ chin lift/jaw thrust/head extension/ neck flexion, Change to other devices noted (ETT) Response to LMA insertion - Hiccup, Laryngo-spasm, any excitatory phenomenon head/limb movements/muscle twitching Anaesthesia was maintained by using 50% oxygen, 50% Air, Sevoflurane and Inj. Cis- Atracurium 0.05 mg/kg incremental dose. Patients were observed for haemodynamic changes at the time of premedication, just before induction and just after LMA insertion 1,2,3,4,5,10 minutes after LMA insertion. 1) Pulse 2) Blood pressure (SBP, DBP, MBP)3) EtCO2 4) SpO2.

On completion of surgery, Neuro muscular blockade was reversed using intravenous Inj. Glycopyrrolate 0.008 mg/kg and Inj. Neostigmine 0.05mg/kg .Postoperatively

complication like Cough / breath holding / laryngeal spasm /presence of blood on devices / lip or dental injuries were noted.

**Statistical Analysis:**

Data was presented in terms of frequency and percentage for qualitative (categorical) variable and for quantitative variables, data was presented in terms of range (min, max), mean, SD. Median ( Inter quartile range) in case data do not follow a normal distribution for both the groups separately. [1,3] The Quantitative variables like Time, BP, HR were calculated by Student t Test and Mann Whitney Test while other Qualitative variable assessment was done by Chi-square and Fischer Exact Test.[2,3]

ANOVA with repeated measures will be applied to see overall significance (inter and intra) for quantitative variables and the level of significance will be taken as $p \leq 0.05$ and the data will be analyzed by using SPSS statistical software version 20.

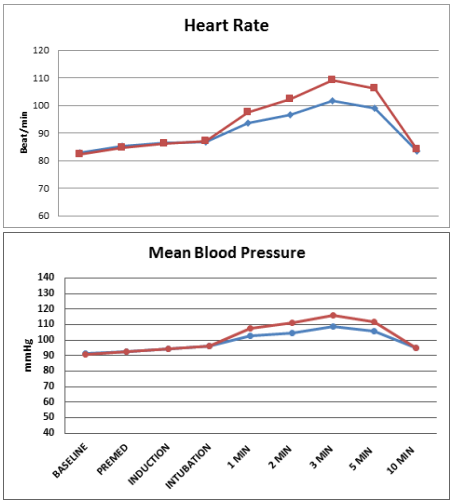
**OBSERVATIONS AND RESULTS:**

Our two study groups Group P who received Inj. Propofol 2mg/kg (red) and Group E who received Inj. Etomidate 0.3 mg/ kg (blue) were similar on baseline characteristics like age (p- value = 0.01) sex distribution (p value =0.254). The nature of surgery and the choice of supraglottic device was standardized and so was the anaesthesia technique to eliminate any confounding errors.

We found initial increase in heart rate in both groups then no change in heart rate in Etomidate Group and fall in heart rate in Propofol group which was not statistically significant (p>0.05) at any point of time.

We found fall in systolic and diastolic blood pressure in both groups just after insertion of LMAwhich was significantly higher in Group P. We found fall in SBP in Group P from just after insertion (p=0.0016) LMA upto 10 minutes after insertion (p=0.0006) which was statistically significant than group E. Fall in mean blood pressure was noted just after insertion of LMA upto 10 minutes after insertion which was statistically significant (p=0.0012).

In our study we found Mean duration of insertion of LMA in Group E was 36.99±2.78 seconds compared to 30.33 ± 2.85 seconds in Group P which was statistically (p=0.0059) significant.The successful insertion of LMAat first attempt was found in 96.3% patients in Group P compared to 90% in Group E. Etomidate alone does not provide adequate jaw relaxation for the insertion of LMA. In our study 18%patients in Group E required manipulation during LMA insertion compared to 7% patients in Group P. 4 patients in Group E developed hiccup following LMA insertion and 1 patient in group P developed excitatory head movement.




**Group P** –RED **Group E-** BLUE

**DISCUSSION:**

The Laryngeal mask was designed primarily as a means of offering some of the advantages of endotracheal intubation while avoiding the fundamental disadvantage of the stress response since the vocal cords need be neither visualized nor forced apart[1,3]. Smooth and successful insertion of LMA requires adequate mouth opening with suppressed upper airway reflexes to avoid gagging, coughing and laryngospasm. Etomidate has been shown to provide stable haemodynamic while blunting the response to laryngoscopy for the induction of anaesthesia[4].The usual induction dose of Propofol needed for adequate jaw relaxation and to prevent other complication to LMA insertion was higher and result in hypotension. Etomidate, as a sole induction agent, does not provide adequate jaw relaxation for the insertion of LMA. The numerous methods like prophylactic dexmedetomidine, fentanyl, succinylcholine, isoflurane used to prevent hypotension and to provide adequate insertion[2,3]. We had taken Propofol in the dose of 2 mg/kg and Etomiate 0.3mg/kg.

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We found initial increase in heart rate in both groups then no change in heart rate in Etomidate group and fall in heart rate in Propofol group which was not statistically significant (p>0.05) at any point of time. We found fall in systolic and diastolic blood pressure in both groups just after insertion of LMAwhich was higher in Group P. We found fall in SBP in Group P from just after insertion (p=0.0012) LMA upto 15 minutes after insertion (p=0.0008) which was statistically significant than group E. Fall in mean blood pressure was noted just after insertion of LMA upto 10 minutes after insertion which was statistically significant (p= 0.0001)

Greizman and Guddal et al used Etomidate in dose of 0.3 mg/kg and Propofol in dose of 3mg/kg in various type of surgeries which included breast fibroadenoma excision, chest abscess incision and drainage, axillary lipoma excision. They found better result than our study because they used succinylcholine as muscle relaxant. The results of this study were in consensus with the results of our study.

Cassemiero and Casetti did a similar study on patients posted for modified radical mastectomy comparing haemodynamic changes in patients with prior placement of thoracic epidural catheter and subsequent induction with Propofol and Etomidate. Igel was used as the standard supra-glottic device in all cases.The results of this study were in consensus with the results of our study.

Da Costa et al in a study on various supraglottic device placement in cases of hysteroscopy observed that Propofol and Etomidate provided similar haemodynamic stability.

Hence we conclude that Etomidate is slightly better than Propofol regarding haemodynamic stability as an induction agent in response to Proseal LMA insertion in patients with moderately low LVEF of 40-50%. Though traditionally considered as a choice, the cardio and haemodynamic stability of etomidate in response to airway manipulation largely depends on ease of placement of device. Standardized to ease of insertion of airway equipment Etomidate and Propofol are probably equally effective in blunting airway reflexes and sympathetic responses.

## CONCLUSION:

We observed that Etomidate is comparatively a more haemodynamically stable drug having a slightly better profile in terms of preventing fall in systolic, diastolic and mean blood pressure as compared to Propofol following Laryngeal mask airway insertion. However it may not provide the ideal insertion condition even if it is supplemented with other anaesthetic agents[4,5].

### Limitations Of Study:

1) The study has been conducted only in patients of Laparoscopic cholecystectomy. The result may vary if all the surgeries are included.
2) We considered patients with LVEF 40-50% only. Hence, the patients with severely impaired cardiac status were excluded.
3) Pro Seal LMA was used in all cases. Other supra-gottic devices like I-Gel may offer better results due to more compatible airway contour alignment.

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