Original Article

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Comparison of Bag and Mask Ventilation versus I-Gel use in Electroconvulsive Therapy

Shriya Pandey[1], Sarita S Swami[2]

Author's Affiliation:

[1]Junior Resident, [2]Professor and Head of Department, Department of Anesthesiology, Bharati Vidyapeeth Medical College (Deemed to be University), Pune, Maharashtra 411043, India.

Abstract

Background: Electroconvulsive therapy formerly known as electroshock is a psychiatric treatment in which seizures were electrically induced to provide relief from psychiatric disorder. The most common technique of anaesthesia used during ECT is General Anaesthesia with bag and mask ventilation which is being used for a long time. However, there are case reports of pulmonary edema, bronchospasm, hemodynamic changes during this technique, so we want to compare the effectiveness of I-gel over bag and mask ventilation in ECT.

Methods: In our study 50 patients were randomized and 25 of them were ventilated with bag and mask. The other 25 patients were ventilated with I-gel. Vital parameters were monitored intra-operatively and postoperatively we observed nausea, vomiting, bronchospasm, sore throat, laryngospasm.

Results: Statistically significant difference were found in mean heart rate and blood pressure values in both the groups. Also we noticed 2 cases of nausea, 1 case of vomiting 2 cases of sore throat in bag and mask group whereas 2 cases of bronchospasm in I-gel group.

Conclusion: Hemodynamic variables were better controlled in I-gel group. Also the post operative complications were less in I-gel group.

Keywords: Electroconvulsive therapy; I-gel; Bag and mask ventilation.

Introduction

Electroconvulsive therapy (ECT), is routinely used in psychiatric treatment in which seizures are electrically induced in patients to provide relief from psychiatric disorders.[1] However, ECT has its systemic effects as follows.[2]

- Cardiovascular effects result from autonomic nervous system activation during ECT procedure.
- There is an increase in cerebral metabolic rate which results in a marked increase in cerebral blood flow and intracranial pressure.
- There is an increase in intraocular pressure and intra-gastric pressure.

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Corresponding Author: Shriya Pandey, Junior Resident, Department of Anesthesiology, Bharati Vidyapeeth Medical College (Deemed to be University), Pune, Maharashtra 411043, India.

Email: shriya.mankeshwar@gmail.com

The most preferred and oldest method of ventilation during maintenance of anaesthesia in the patients of ECT was bag and mask ventilation. However, recent literature has documented a rare but severe complication like, negative pressure pulmonary edema. Recently, few studies have shown that use of laryngeal mask airway (LMA), is a safe and effective method of ventilation in ECT.

Haeck et al in year 2011[3], suggested that laryngeal mask could be a good method of controlling hyperventilation and obtaining a longer convulsion time. I-gel is a novel and innovative supraglottic airway device, made of a thermoplastic elastomer (styrene ethylene butadiene styrene), which is soft and gel like. Its advantages:

- Easy to insert.
- Effective seal pressure, prevents aspiration and maintains effective ventilation.
- Lack of inflatable cuff results in lower incidence of sore throat.

Therefore, we decided to compare the effectiveness of a bag and mask ventilation versus I-gel for ECT.

Methods

After obtaining an approval from the ethical committee, a prospective randomized controlled trial study was conducted in tertiary care hospital. 50 patients belonging to ASA I & II, posted for an elective ECT were included in the study. Patients with co-morbid condition and pregnant patients were excluded from the study. Written informed consent of the patient and their relatives were obtained. On the day of procedure standard monitors were attached in the ECT Room and vital parameters were noted. A common protocol of general anaesthesia was followed for all the patients as given:

Premedication with Inj. Glyopyrrolate (0.2mg IV/ IM),

Induction with Inj. Propofol (2mg/kg IV),

INJ Succinylcholine as muscle relaxant (1mg/kg IV).

Then 25 patients in (group 1) were ventilated with bag and mask. The other 25 patients (group 2) were ventilated with I-gel. Vital parameters (heart rate, blood pressure, Spo_2, and end tidal CO_2) were closely monitored for each patient throughout the intra-operative period. And post operatively we observed following complications: nausea, vomiting, laryngospasm, bronchospam and sore throat for 24 hours.

Statistical Analysis

Results were tabulated and were analysed using T-test and SPSS software.

Results

The gender, age group and BMI amongst both the study groups were statistically not significant as shown in (Table 1). Intra-operative heart rate were higher in 25 % of patients in group 1 as compared to group 2 after the induction of ECT and it was statistically significant (p value<0.05) as shown in (Table 2). Intra-operative systolic and diastolic blood pressure were higher in group 1 from baseline after the induction of ECT for 2-5 minutes as compared to group 1 as shown in (Figure 3, 4).

Postoperatively, we observed 2 cases of sore throat, 1 case of nausea and 2 cases of vomiting in group 1. However 2 cases of bronchospasm were observed in group 2.

Table 1: Demographic characteristics of patients in both groups.

Age (years)	Group 1 (n=25)		Group 2 (n=25)		P-value
	Mean	SD	Mean	SD	
Age (years)	40.04	11.23	34.96	11.22	0.116NS
Sex					0.390
Males	12(48)		9(36)		
Females	13(52)		16(64)		
BMI	22.98	3.79	23.88	4.28	0.438^{NS}

Discussion

Electroconvulsive therapy is a biological treatment procedure involving a brief application of electric stimulus for the treatment of refractory or resistant psychiatric disorders. The oldest and safest method of ventilation in ECT was bag and mask ventilation as it did not cause post ictal confusion or agitation in the patients.

A rare and severe complication was noticed due to forced inspiration against closed glottis causing negative pulmonary pressure edema. Janaki R. Manne, Yusuf Kasirye in year 2011[4] showed in their study that pulmonary edema occurred due to forced inspiration against a closed glottis while performing ECT.

Our primary objective was to compare the haemodynamic variables like pulse rate, systolic blood pressure (SBP), diastolic blood pressure (DBP), end tidal CO_2($EtCO_2$), SpO_2 in both the groups.

Table 2: Intra operative comparison of mean intra-op pulse rate.

Pulse rate (per min)	Group 1 (n=25)		Group 2 (n=25)		P-value
	Mean	SD	Mean	SD	(Inter-group)
Baseline	84.64	4.30	87.96	6.79	0.067NS
1-min	85.92	3.81	88.16	5.32	0.093NS
2-min	87.52	3.66	88.16	5.32	0.623NS
3-min	87.24	4.56	89.76	4.81	0.063NS
4-min	86.17	4.71	89.44	4.18	0.013*
5-min	84.33	4.11	89.76	6.51	0.001***
6-min	83.25	4.64	88.76	4.43	0.001***
7-min	83.29	4.24	87.12	2.59	0.001***
8-min	83.17	4.37	86.80	4.55	0.006**
9-min	82.00	3.73	87.00	4.05	0.001***
10-min	82.50	4.31	86.76	4.49	0.001***

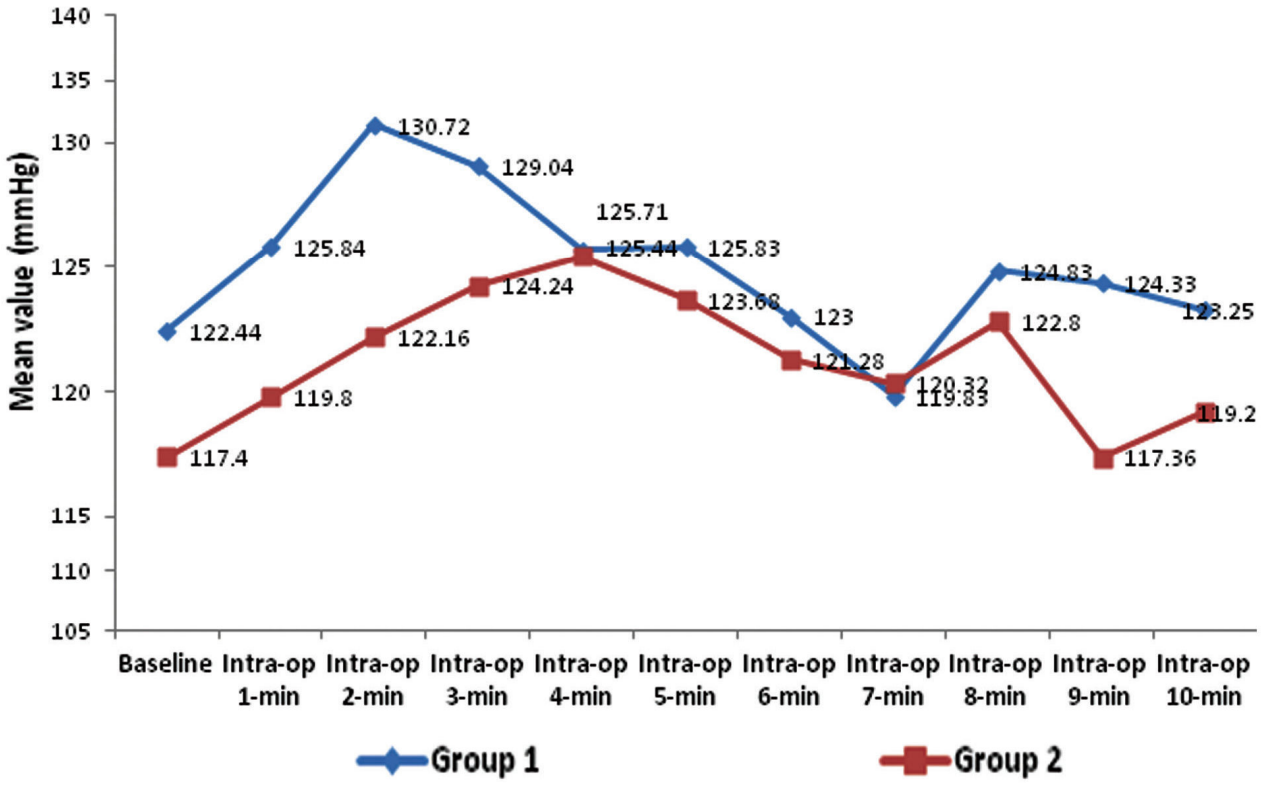

Fig. 3: Intraoperative comparison of mean systolic Blood Pressure.

We observed that after giving ECT intra-op mean pulse rate, systolic blood pressure and diastolic blood pressure was higher in group 1 as compared to group 2 from baseline for 4-5 minutes (p value<0.05), it was statistically significant

These parameters were comparable with a study done by Fumio Nishihara, Makio Ohkawa, Haruhiko Hiraoka, Naoya Yuki, and Shigeru Saito, in year 2003[5] compared the haemodynamic changes during ECT between two groups where they used bag and mask and laryngeal mask airways for ventilation. They observed that mean pulse rate was higher in bag and mask group than the LMA group at 2 minutes after ECT. Similar change in blood pressure was observed after 5 minutes of ECT in bag and mask group. Whereas in laryngeal mask group, it was increased after 3 minutes of ECT. They hypothesised that because of accumulation of carbon dioxide, the haemodynamic changes were observed. They also observed increase in seizure threshold in these patients. Our second objective was to observe post-operative complications like

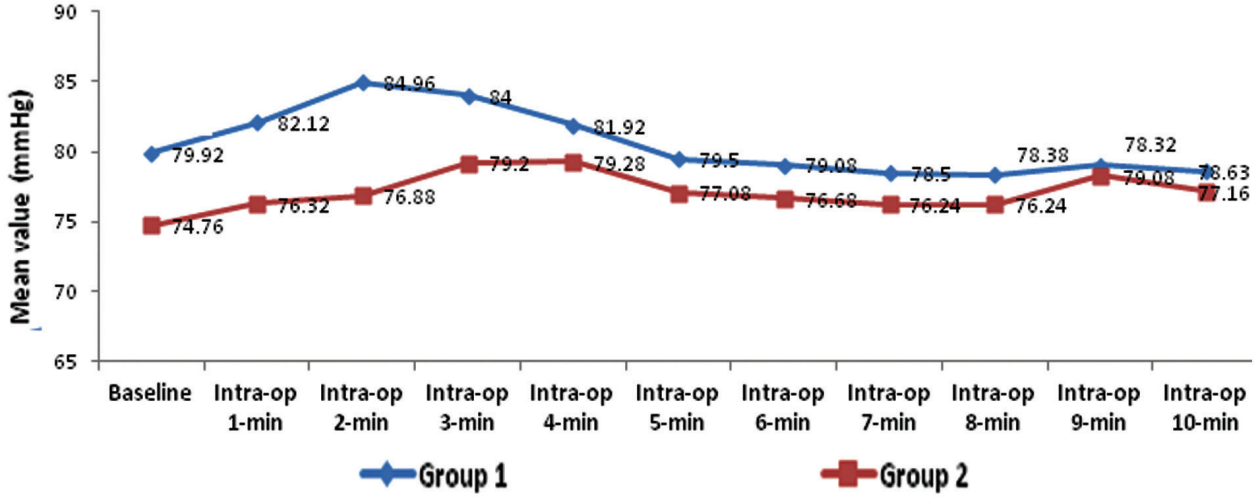

Fig. 4: Intraoperative comparison of mean intra-op diastolic Blood Pressure.

sore throat, nausea, vomiting, laryngospasm and bronchospasm, every 15 minutes after patient was shifted out for 1 hour, then every 2 hourly for 1st 4 hours and every 4th hourly for remaining 24 hours.

We observed bronchospasm in 2 cases of group 2 whose BMI were 30kg/m2 and 25kg/m2, but there were no such cases noticed in group 1. We also noticed that there were 2 cases of sore throat, 1 case of nausea and 2 cases of vomiting in group 1 .

Our findings were comparable with the study done by Joseph Brimacobe in year 2000.[6] He compared the incidence of post-operative sore throat, pharyngo-laryngeal discomfort between bag and mask and laryngeal mask airways and concluded that incidence of bronchospasm was seen due to improper mask size or tight fitting mask. He also found jaw discomfort in laryngeal mask airways group due to improper insertion. J. Dingley in year 1994[7] compared the incidence of post-operative sore throat between laryngeal mask airways and bag and mask ventilation and observed that incidence of sore throat was higher in Laryngeal mask groups as compared to bag and mask.

The incidence of sore throat in bag and mask were present in those patients where ventilation was difficult and Guedel's airway was used for proper ventilation.

Therefore, from our study we can conclude that I-GEL can be used as an alternative way of ventilation instead of Bag and mask in ECT.

Conclusion

We conclude that I-GEL is a better and effective way of ventilation in electroconvulsive therapy as compared to bag and mask ventilation. However, more studies are needed to prove its efficacy

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