COMPARATIVE ASSESSMENT OF I-GEL SUPRAGLOTTIC AIRWAY INTERVENTION VERSUS STANDARD TECHNIQUE OF ENDOTRACHEAL EXTUBATION FOR ATTENUATION OF PRESSOR RESPONSE IN CONTROLLED HYPERTENSIVE PATIENTS

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ABSTRACT:

Aim: The goal of this study is to compare the use of I-Gel intervention (Bailey's manoeuvre) before endotracheal extubation, versus conventional extubation, in controlled hypertensive patients under general anaesthesia and thus check for the efficiency of the manoeuvre in attenuating pressor response at extubation. Materials and Methods: After ethics committee approval 68 patients belonging to ASA II, controlled hypertensives, undergoing elective surgeries under general anaesthesia were randomized into two groups of 34 each. 10 minutes before the end of the surgery at Sevoflurane MAC 1, patients belonging to the I-Gel study group were extubated at a deep plane after I-Gel placement. The patients in the ETT group had the endotracheal tube retained. Both groups of patients then had their airways extubated as per standard extubation criteria and HEART RATE, SBP,DBP, MAP,spO2 at 0,1,3,6,8,10 minutes post extubation observed. Coughing, bucking and ECG changes were compared between both groups. Ease of insertion of I-Gel and desaturation during exchange was also observed. Results: There was a significantly lesser heart rate, SBP, MAP elevation in the I-Gel group when compared to the endotracheal tube group. However less significant difference in diastolic blood pressure and no difference in oxygen saturation was present. The patients in I-Gel group also had statistically significant lower occurrence of coughing and bucking at extubation.

Conclusion: The Bailey's manoeuvre is a smooth and effective technique and elicits much lesser haemodynamic response in terms of heart rate, SBP, MAP at extubation in controlled hypertensive patients.

INTRODUCTION:

Laryngoscopy, endotracheal intubation and extubation are airway manipulations that account for the noxious stimuli that induce profound changes in cardiovascular physiology, and elicit reflex responses. Although these responses may be of short duration and of little consequence in healthy individuals, serious derailments can occur in individuals with coronary artery disease, uncontrolled hypertension, reactive airways such as asthmatics, or in the presence intracranial pathologies. Instrumenting and manipulating of airway leads to acute sympathoadrenal discharge culminating in undesirable hemodynamic disturbances such as increase in heart rate and hypertension. This pressor response can lead to various adverse events such as myocardial ischemia, arrhythmias, and cerebrovascular accidents in susceptible individuals, and can prove detrimental in the background of increased intracranial or intraocular pressures. These adverse effects are very detrimental during endotracheal extubation in contrast to intubation, as during intubation these reflexes will partly or wholly be blunted after administration of induction and inhalational agents. Conversely, at extubation there are transient increases in the arterial blood pressure and heart rate (HR) in the range of 10% to 30% which may last anywhere from 5 to 15 minutes, and may lead to unfavourable sequelae. A smooth endotracheal tube extubation without coughing, bucking, or hemodynamic changes is one of the paramount anaesthetic goals as a part of conduct of general anaesthesia.

Since hypertensives and patients with CAD will reap maximum benefits from the safety profile of an attenuated pressor response, this would be a useful technique of extubation in the hypertensive strata and hence hypertensives have been chosen as the study population. Uncontrolled hypertensives may require rescue boluses of antihypertensives at extubation to mitigate sustained hypertensive or tachycardic response and to maintain stable haemodynamics, this may confound the study results so we have excluded uncontrolled hypertensives belonging to ASA III classification and above from the study.

There are various pharmacological and non -pharmacological techniques that have been employed to attenuate the stress response at extubation. Drugs such as lignocaine, betablockers such as esmolol, and newer options like dexmedetomidine are being used for the attenuation of the pressor response. Supraglottic airway devices (SADs) have recently gained immense popularity not only for their use in airway management, are also a part of difficult airway management (DAS guidelines), but also for causing fewer cardiovascular responses at removal than the extubation of endotracheal tube. Insertion of SADs cause lesser laryngeal trauma and may hence provoke less sympathetic stimulation. Since the inception of the Bailey manoeuver, various authors have advocated for the substitution of ETT with SADs before the emergence from anaesthesia.(1) This procedure has been found to be associated with a lesser hemodynamic stress response during extubation as well as a smooth recovery period. Various supraglottic devices such as the Classic laryngeal mask airway (LMA) and the Ambu laryngeal mask have been referred to in the literature with respect to their use during the Bailey manoeuvre. Although I-gel supraglottic airway has been used to decrease the sympathetic response during extubation, there is a paucity of information in the literature about its use during the Bailey manoeuvre. The emergence profile of the I-GEL supraglottic airway device provides more haemodynamic stability without losing control or patency of the airway. The IGEL supraglottic airway has been chosen in view of ease of insertion compared to other supraglottic devices such as the Proseal or Classic Laryngeal Mask Airways which are routinely employed for the purpose of Bailey’s manoeuvre.(2)

PHYSIOLOGY: RESPONSES TO AIRWAY MANIPULATION

Cardiovascular Reflexes These responses are mediated by the proprioceptors triggered by tissue irritation in the periglottic region and trachea. These receptors include mechanoreceptors that are small-diameter myelinated fibres, slowly - adapting stretch receptors that are large diameter myelinated fibres, and polymodal endings of nonmyelinated nerve fibres. The superficial location of these proprioceptors and their nerves explains why topical local anaesthesia of the airway is an effective means of blunting cardiovascular responses to airway interventions. (3) The glossopharyngeal and vagal afferents transmit these impulses to the brainstem, which, in turn, causes widespread autonomic activation through the sympathetic and parasympathetic nervous systems. In adults and adolescents, airway instrumentation leads to hypertension and tachycardia mediated by the cardio-accelerator fibres and sympathetic chain ganglia. (4) This response results from the release of norepinephrine from adrenergic nerve terminals and the secretion of epinephrine from the adrenal medulla or partly may also result from activation of the renin-angiotensin system, innervated by β-adrenergic nerve terminals. All these responses are exaggerated in patients with existing hypertension. Myocardial ischemia results when there is mismatched myocardial oxygen supply and demand. In the presence of stable oxygen content of whole blood, the myocardial oxygen supply is almost entirely determined by coronary blood flow and distribution because oxygen extraction at the cellular level is at or near maximum even under resting conditions. The chief components of demand of the myocardial O2 are heart rate and myocardial wall tension.

Of the two, increases in heart rate is of greatest concern because not only does increase in chronotropy increases myocardial oxygen consumption per minute at constant wall tension, but elevations in rate effectively reduce the diastolic period. Because full diastolic relaxation may be impaired, a subsequent increase in resting wall tension will impair subendocardial blood flow, thereby reducing myocardial O2 supply. The neuroendocrine responses to airway manipulation resulting in tachycardia and HTN may result in a variety of complications in patients with cardiac disease, myocardial ischemia chief among them. This set of circumstances is responsible for episodes of ischemic electrocardiographic ST-segment depression and increased blood pressure

(BP) that may be seen when airway instrumentation in patients with arteriosclerosis; occasionally, these episodes presage the occurrence of a perioperative myocardial infarction. STsegment changes of a single duration lasting longer than 20 minutes (me an SD 20 ± 30 minutes) or cumulative durations of longer than 1 hour (mean SD 1 ± 2 hours) are an important factor associated with adverse perioperative cardiac outcomes. Tracheal extubation in hypertensive patients produces greater increases in HR and BP than which occurs in normotensive patients. Therefore, we compare the hemodynamic changes during extubation and removal of LMA in hypertensive patients.

Endotracheal extubation is a crucial step at emergence from anaesthesia and can be associated with 10 – 30 % increase in blood pressure and HR lasting 5 – 15 minutes. Coughing, bucking, restlessness can also occur at emergence at 38 to 96% cases. Even though such complications usually produce no consequence in healthy individuals, patients with hypertension and coronary artery disease may be predisposed to unfavourable outcomes, which is the rationale behind this study.

Attenuation of pressor response Many pharmacological and non-pharmacological methods have been used to reduce these hemodynamic changes. Drugs such as beta blockers, diltiazem,

opioids (fentanyl, alfentanil), local anesthetics such as lignocaine and vasodilators like nitroglycerine have been used to attenuate haemodynamic response at extubation. Nonpharmacological methods like, smooth and gentle extubation with a minimal proprioceptor stimulation. None of these above mentioned approaches have been proved entirely satisfactory. Hence, the search for an ideal method to attenuate the haemodynamic responses is still continuing.

The Bailey's manoeuvre first performed by performed by Dr. Paul Bailey, A consultant anesthesiologist at Royal National Throat Nose and Ear hospital. This manoeuvre is performed by replacing the endotracheal tube with a laryngeal mask airway under a deep plane of anesthesia. (4) The Bailey manoeuvre is also incorporated in the Difficult Airway Society guidelines for extubation in the "at-risk" algorithm. (5)

METHOS AND MATERIALS:

This Prospective Single Blinded Randomized Study was conducted at Sri Ramachandra Institute of Higher Education and Research (SRIHER), Porur, Chennai, India from the period of 2021 – 2022

The required sample size was 28 in each group. To account for a non -participation rate/ loss to follow up rate of a about 20%, another 6 subjects were added to the sample size. Hence the final required sample size was 34 subjects in each group. Heart rate, Systolic Blood Pressure, Diastolic Blood Pressure, MAP & spO2 were considered as primary outcome variables. The entire data was validated by checking for and correcting any unusual values and typographic errors. All the quantitative variables checked for compliance with normal distribution within each study group by using visual inspection of histograms and normality Q-Q plots. The mean and standard deviation of the normally

distribute d quantitative variables will be compared between the two groups using independent sample t-test. The qualitative variables will be compared between the two methods using the Chi-square test/ Fisher's exact test. P Value < 0.05 will be considered as statistically significant.
Study population included consenting patients between ages 18–65 years both Male and female belonging to ASA class II of controlled hypertensives posted for elective surgeries under general anaesthesia. According to AHA/ACC guidelines, hypertension is defined as persistently elevated BP (blood pressure) ≥140/90 mmHg. Controlled hypertensives belonging to ASA class II are those patients whose BP is <140/90 mmHg under regular antihypertensives.
Patients with pulmonary diseases (including COPD, asthma), pregnant patients, diabetics with HbA1c>6.5%, morbidly obese patients, anticipated difficult airways, neurological diseases with compromised airway patency, bleeding diathesis, patients having unanticipated difficult airways requiring =/> 2 trials at intubation or laryngoscopy duration more than 15 seconds were all excluded from the study. Major surgeries, surgeries involving major blood loss or fluid shifts eg. Laparotomies, prolonged surgeries (duration >4 h), surgery of the oral cavity and airway, facial bones and facial structures were also not included in the study.
Trial was explained and informed consent taken from all trial participants ,participating patients were divided in two groups based on computer generated numbering sequence for randomization and as this was a single-blinded study, sealed opaque envelopes numbered in sequence used for concealment of allocation.

- Group ETT who underwent endotracheal extubation by employing the standard routine method of awake extubation.
- Group I-GEL in whom I-Gel supraglottic device was inserted followed by which the endotracheal tube was removed on a deep plane (Bailey manoeuvre), and I-Gel removed at end of the procedure.

PREOPERATIVE:
Routine systematic pre-anaesthetic evaluation of patients done before patients were enrolled in the study. All laboratory investigations, cardiac evaluation and imaging done as per institution protocol. Fasting was advised for 8 hours before anaesthesia. Patients asked to continue their usual dose of antihypertensive medications as advised routinely. On the day of surgery, half an hour prior to anaesthesia, IV Pantoprazole 40mg and IV Metoclopramide 10mg was given as a measure for Aspiration Prophylaxis.

INTERAOPERATIVE:
After wheeling the patient in to the OR, standard ASA monitoring devices were connected which included the Electrocardiogram(5 leads), pulse oximeter and the non -invasive blood pressure measuring cuff. An 18- gauge cannula secured for intravenous access. Induction of anaesthesia performed by administering injection Fentanyl 2 μg/kg and injection Propofol 2 mg/kg, until patient lost response to the verbal commands. Airway secured with appropriate size endotracheal tube after administering muscle relaxant injection Vecuronium 0.1mg/kg of ideal body weight. Anaesthesia was maintained intraoperatively with inhalational agent as Sevoflurane to achieve a MAC of 1. FiO_2 of oxygen kept at 40%. The ventilator settings were adjusted to deliver a tidal volume of 6-8ml/kg and to maintain an end-tidal carbon dioxide value ($ETCO_2$) between 30-35 mmHg. Additional doses of muscle relaxant (Vecuronium) was given if required. Intraoperatively, further boluses of injection Fentanyl 1 μg/kg was given 90 min after the induction dose, to maintain adequate analgesia. All patients received IVF Kabilyte as maintenance fluid according to Holiday-Segar equation for fluid management. Third space loss was replaced as 5ml/kg. Blood loss if present was accounted. Surgeries involving major fluid shifts and loss of blood were excluded in the initial participant selection. Ten minutes prior to the ending of the surgical procedure, the patients were ventilated with OXYGEN and with Sevoflurane to maintain depth at MAC 1 level, and after thorough oropharyngeal suctioning in head-low position, the I-Gel of appropriate size based on bodyweight was inserted behind the

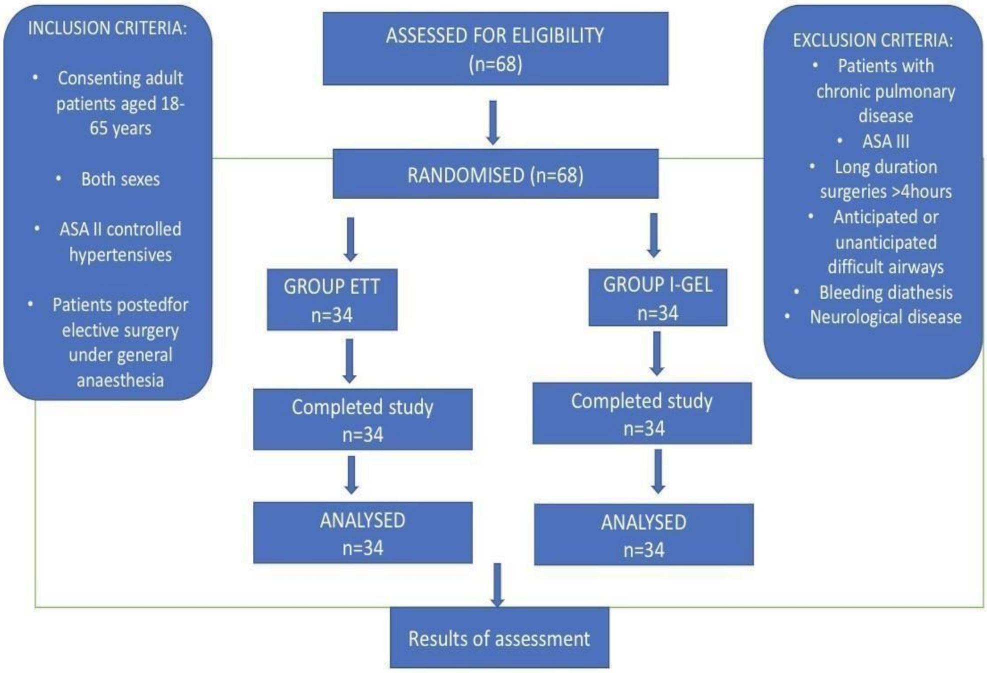
endotracheal tube in patients belonging to Group I-Gel. The endotracheal tube cuff was deflated and tube removed. Appropriate size gastric tube was lubricated and passed through the gastric port of the I-Gel to ensure proper positioning and to prevent aspiration. After ensuring proper seating of the I-Gel by auscultation, exhaled tidal volume, capnography, ventilation continued with the I-Gel device until the end of surgery. In both the study groups, standard extubation criteria was followed, which include an alert patient able to obey commands, smooth spontaneous ventilation with adequate tidal volume, 5 second head lift, haemodynamic stability. Injection neostigmine 0.05 mg/kg and injection Glycopyrrolate 0.01mg/kg administered to reverse neuromuscular blockade. The I-Gel or endotracheal tube were removed after proper suctioning in I-Gel or ETT group respectively.

▪ All vital parameters were recorded in the following time intervals:
1. upon arrival to the OR (baseline)
2. at I-Gel exchange
3. just before extubation
4. after extubation
5. 1, 3, 6, 8 and 10min after extubation (by an independent observer)

FIGURE 1. THE BAILEY MANOEUVRE (INSERTION OFI-GEL BEHIND THE ETT)

FIGURE 2 . REMOVAL OF ETT AFTER I-GEL EXCHANGE

FIGURE 3. CONSORT FLOW CHART



OBSERVATION AND RESULTS

TABLE 1. DEMOGRAPHIC VARIABLES – AGE AND SEX

GROUP		Mean	Std. Deviation	p value
AGE	ETT GROUP	53.03	12.70	0.153
	I- GEL GROUP	49.21	8.76	

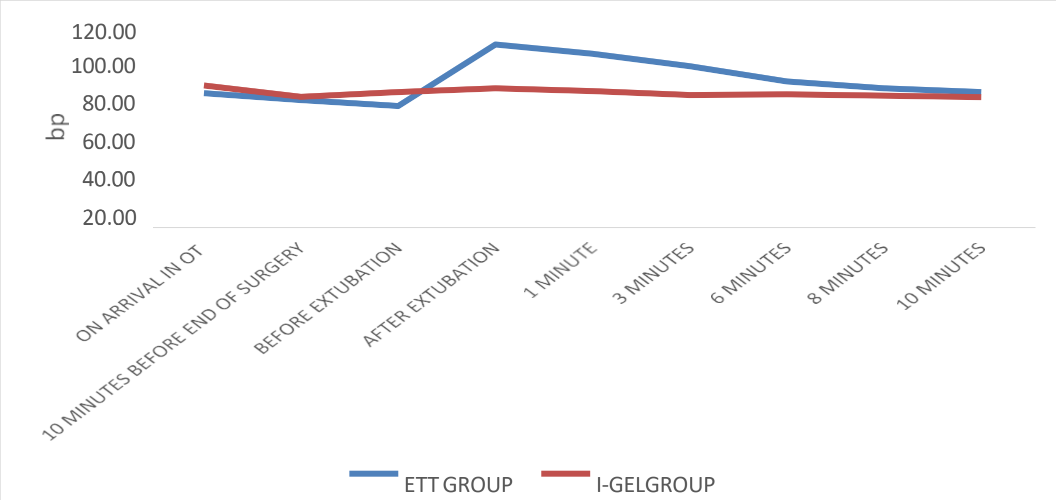
			GROUP		Total	P value
			ETT GROUP	I- GEL GROUP		
SEX	F	Count	20	13	33	0.089
		% within GROUP	58.8%	38.2%	48.5%	
	M	Count	14	21	35	
		% within GROUP	41.2%	61.8%	51.5%	
Total		Count	34	34	68	
		% within GROUP	100. 0%	100. 0%	100. 0%	

The above tables show age and gender distribution between the two groups with a p-value of 0.153 and 0.089 respectively (>0.05), hence comparable in terms of a g e a nd gender.

TABLE 2 . DISTRIBUTION OF MEAND AND STANDARD DEVIATION OF HEART RATE BETWEEN THE GROUPS AT SERIAL TIME INTERVALS

HR	ETT GROUP		I- GEL GROUP		P value
	Mean	SD	Mean	SD	
ON ARRIVAL IN OT	77.91	7.25	82.38	12.46	0.075
10 MINUTES BEFORE END OF SURGERY	73.91	6.46	75.74	7.76	0.296
AFTER EXTUBATION	106. 24	7.63	80.71	9.81	<0. 0001
1 MINUTE	100. 79	9.31	79.06	8.36	<0. 0001
3 MINUTES	93.68	6.24	76.79	7.36	<0. 0001
6 MINUTES	84.65	7.73	77.18	7.46	<0. 0001
8 MINUTES	80.71	7.40	76.41	7.09	0.017
10 MINUTES	78.62	6.41	75.62	6.69	0.063

FIGURE 4: COMPARISON OF HEART RATE

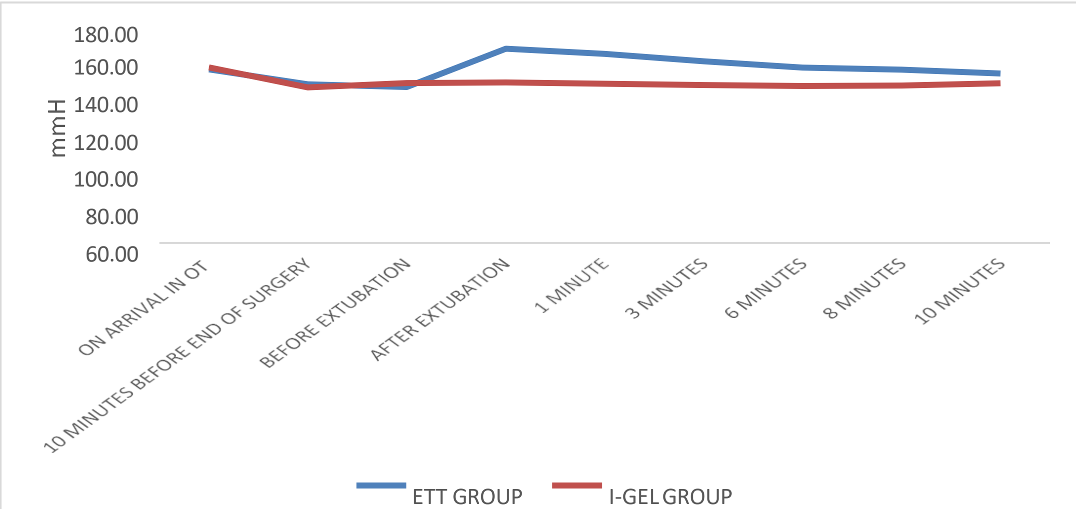


Mean HR in the group I-Gel after extubation and at one, three and six minutes after extubation is substantially lower than in the endotracheal tube extubation group with p -value of <0.0001 at the respective time intervals mentioned. This is statistically significant difference.At the eighth minute there is some reduction in heart rate in group I- Gel (p=0. 017).However, there was no statistical difference in heart rate reduction at the tenth minute after extubation between either groups (p-value 0.063)

TABLE 3: DISTRIBUTION OF MEAND AND STANDARD DEVIATION IN SBP (SYSTOLIC BLOOD PRESSURE) BETWEEN TWO GROUPS

SBP	ETT GROUP		I- GEL GROUP		P value
	Mean	SD	Mean	SD	
ON ARRIVAL IN OT	142. 18	8.35	143. 74	14.34	0.586
10 MINUTES BEFORE END OF SURGERY	129. 88	9.40	127. 35	13.83	0.381
BEFORE EXTUBATION	127. 68	7.32	130. 91	11.99	0.184
AFTER EXTUBATION	159. 12	11.52	131. 44	11.36	<0. 0001
1 MINUTE	154. 97	12.37	130. 26	8.27	<0. 0001
3 MINUTES	148. 76	11.54	129. 29	8.73	<0. 0001
6 MINUTES	143. 71	10.68	128. 41	9.83	<0. 0001
8 MINUTES	142. 06	11.49	128. 85	8.65	<0. 0001
10 MINUTES	138. 88	10.48	130. 65	8.05	0.001

FIGURE 5: COMPARISON OF SBP

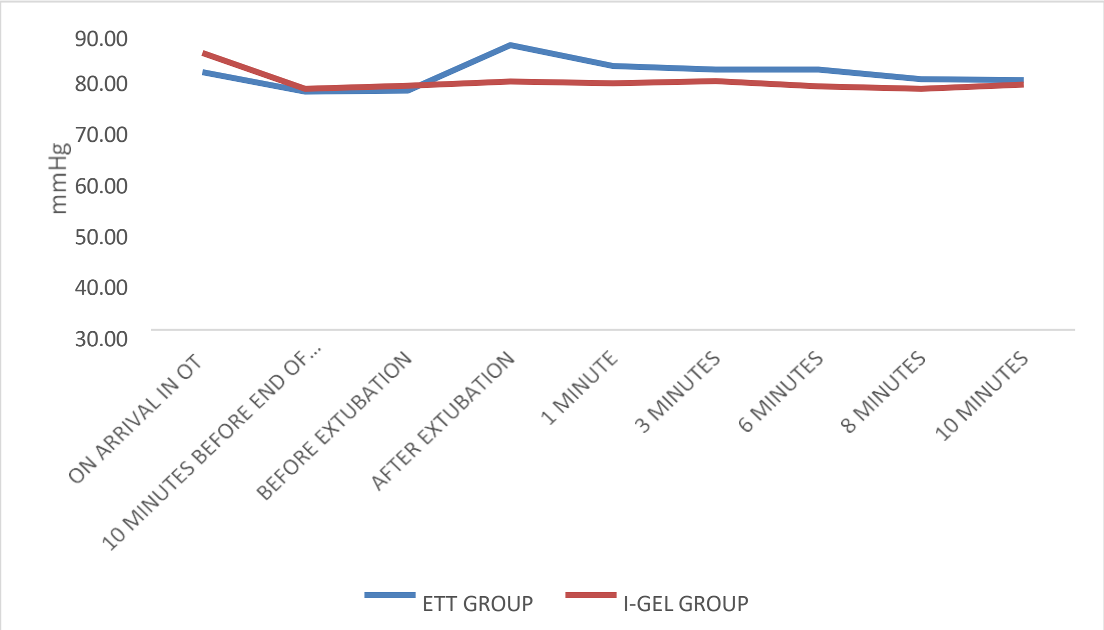


The mean and standard deviation of SBP between the 2 groups at different time intervals, there is statistically significant reduction in SBP immediately after extubation also at one, three, six and eight minutes post extubation in the I-Gel group(p<0. 0001).However, there is not much difference at ten minutes after extubation between the groups.

TABLE 4: DISTRIBUTION OF MEAN AND STANDARD DEVIATION IN DIASTOLIC BLOOD PRESSURE BETWEEN THE GROUPS

DBP	ETT GROUP		I- GEL GROUP		P value
	Mean	SD	Mean	SD	
ON ARRIVAL IN OT	77.26	6.63	83.06	10.91	0.010
10 MINUTES BEFORE END OF SURGERY	71.41	5.54	72.29	9.03	0.629
BEFORE EXTUBATION	71.74	5.26	73.18	8.02	0.384
AFTER EXTUBATION	85.38	7.66	74.50	7.94	<0. 0001
1 MINUTE	79.09	7.51	73.94	8.52	0.010
3 MINUTES	77.97	7.39	74.62	8.49	0.087
6 MINUTES	77.97	6.34	73.06	6.95	0.003
8 MINUTES	75.18	5.58	72.29	8.49	0.103
10 MINUTES	74.91	6.05	73.56	8.92	0.467

FIGURE 6: COMPARISON OF DBP

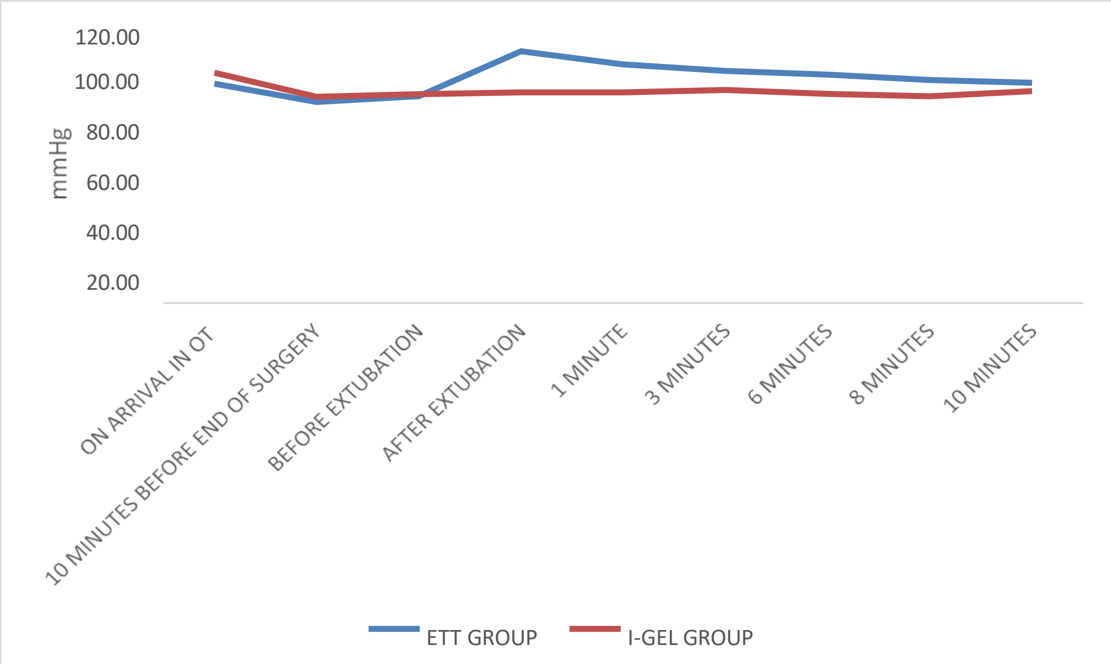


Reduction in Diastolic blood pressure in the group I - Gel is significant immediately post extubation, and at first and sixth minute after the same. At other intervals there is no significant reduction in the I- Gel group.

TABLE 5: DISTRIBUTION OF MEAN AND STANDARD DEVIATION IN MEAN ARTERIAL PRESSURE BETWEEN THE GROUPS

MAP	ETT GROUP		I- GEL GROUP		P value
	Mean	SD	Mean	SD	
ON ARRIVAL IN OT	95.94	17.07	100. 68	13.56	0.210
10 MINUTES BEFORE END OF SURGERY	87.91	15.89	90.09	9.90	0.500
BEFORE EXTUBATION	90.50	5.21	91.21	7.76	0.661
AFTER EXTUBATION	110. 09	7.21	92.03	9.68	<0. 0001
1 MINUTE	104. 35	8.15	92.03	6.89	<0. 0001
3 MINUTES	101. 53	7.56	93.15	9.97	<0. 0001
6 MINUTES	99.91	6.57	91.38	6.71	<0. 0001
8 MINUTES	97.44	6.56	90.29	9.00	<0. 0001
10 MINUTES	96.24	6.51	92.56	6.96	0.028

FIGURE 7: COMPARISON OF MEAN ARTERIAL PRESSURE



According to the results analysis, there is significant drop in mean arterial pressure values in the intervention group after extubation and at all serial intervals until 10 minutes post extubation.

TABLE 6: DISTRIBUTION OF MEAN AND STANDARD DEVIATION OF OXYGEN SATURATION BETWEEN THE TWO GROUPS

SPO2	ETT GROUP		I- GEL GROUP		P value
	Mean	SD	Mean	SD	
ON ARRIVAL IN OT	99.68	0.68	99.91	0.29	0.069
10 MINUTES BEFORE END OF SURGERY	100. 00	0.00	100. 00	0.00	n/a
BEFORE EXTUBATION	100. 00	0.00	100. 00	0.00	n/a
AFTER EXTUBATION	99.74	0.57	99.97	0.17	0.024
1 MINUTE	99.68	0.73	99.91	0.29	0.084
3 MINUTES	99.97	0.17	99.85	0.44	0.148
6 MINUTES	99.91	0.38	99.97	0.17	0.412
8 MINUTES	99.71	0.68	99.91	0.29	0.107
10 MINUTES	99.71	0.76	99.97	0.17	0.052

FIGURE 8: COMPARISON OF DESATURATION

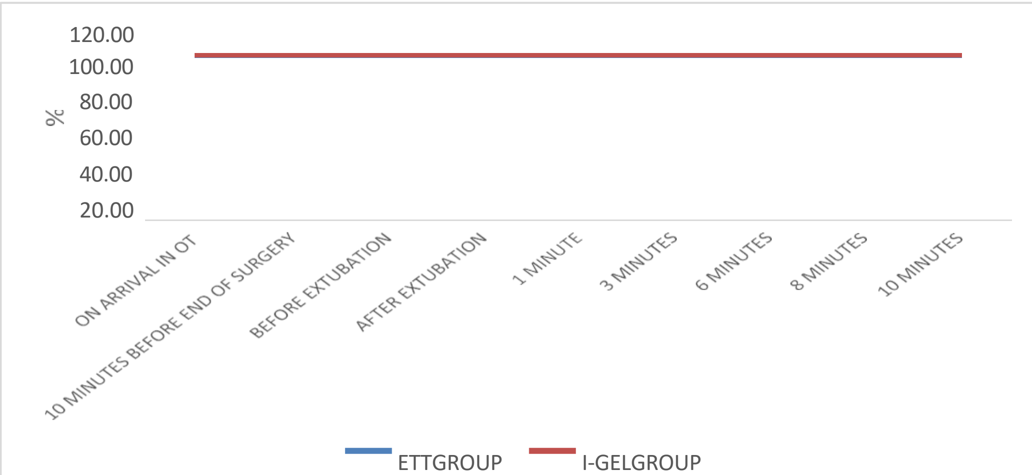


TABLE 7: MEAN AND STANDARD DEVIATION OF VARIABLES AT I-GEL EXCHANGE

AFTER I GEL EXCHANGE	I- GEL GROUP	
	Mean	SD
HR	78.56	9.72
SBP	130. 91	11.99
DBP	73.18	8.02
MAP	91.21	7.76
SPO2	100. 00	0.00

During exchange of the device, the mean heart rate was 78.56 +/ - 9.72, systolic and diastolic pressures were 130.91 +/ - 11.99 ad 73.18 +/- 8.02 respectively and mean arterial pressure was 91.21 +/ - 7. 76. These values are still lesser when compared to the baseline values of the same variables in these patient.

SECONDARY OUTCOMES:

TABLE 8: FREQUENCY AND PERCENTAGE OF ECG CHANGES

<table>
<tr><td colspan="3" rowspan="2"></td><td colspan="2">GROUP</td><td rowspan="2">Total</td><td rowspan="2">P value</td></tr>
<tr><td>ETT GROUP</td><td>I- GEL GROUP</td></tr>
<tr><td rowspan="4">ECG CHANGES</td><td rowspan="2">NO</td><td>Count</td><td>31</td><td>34</td><td>65</td><td rowspan="6">0.076</td></tr>
<tr><td>% within GROUP</td><td>91.2%</td><td>100. 0%</td><td>95.6%</td></tr>
<tr><td rowspan="2">YES</td><td>Count</td><td>3</td><td>0</td><td>3</td></tr>
<tr><td>% within GROUP</td><td>8.8%</td><td>0.0%</td><td>4.4%</td></tr>
<tr><td colspan="2" rowspan="2">Total</td><td>Count</td><td>34</td><td>34</td><td>68</td></tr>
<tr><td>% within GROUP</td><td>100. 0%</td><td>100. 0%</td><td>100. 0%</td></tr>
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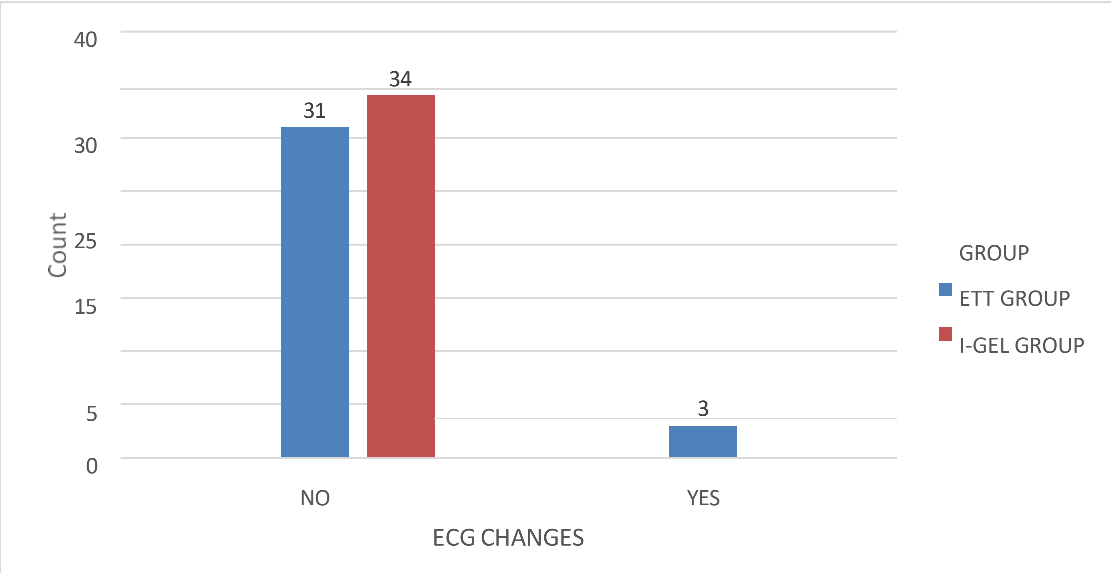
FIGURE 9: COMPARISON OF ECG CHANGES



3 patients exhibited ECG changes in the form of non -significant ST segment depression concurrent with tachycardia in the endotracheal tube group, with no patients showing changes in the I - Gel group. These variables compared using Pearson Chi -Square test, and p value is 0. 076 which is not statistically significant.

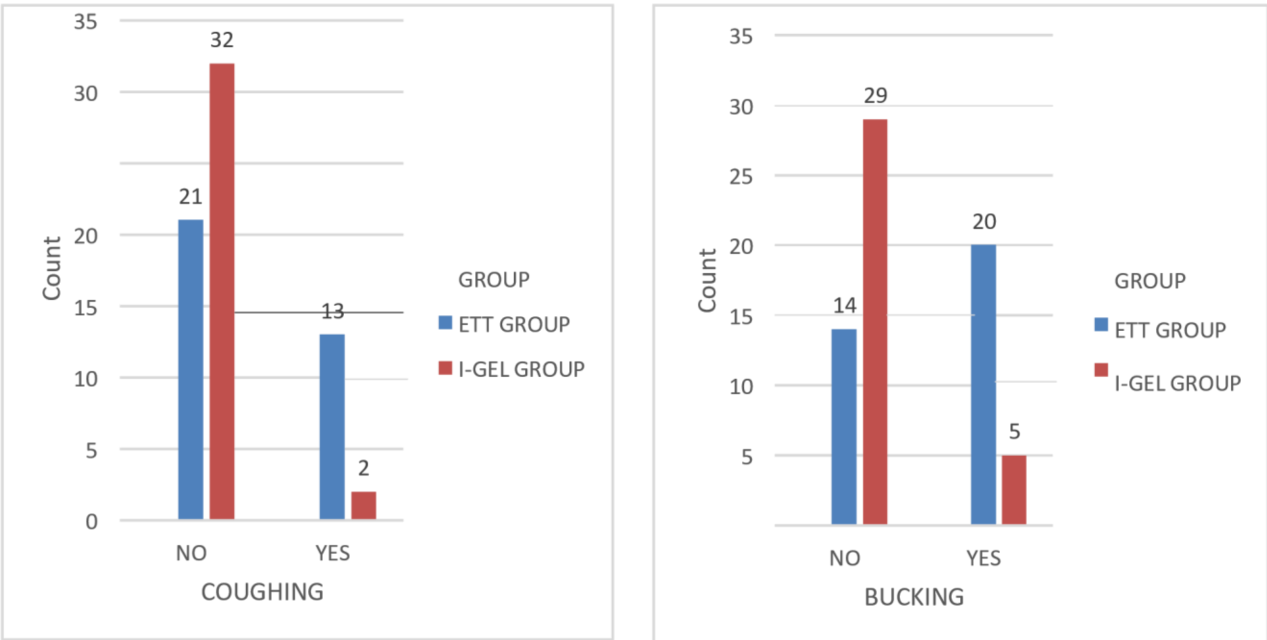
TABLE9: FREQUENCY AND PERCENTAGE OF PATIENTS WITH COUGHING

			GROUP		Total	P value
			ETT GROUP	I- GEL GROUP		
COUGHING	NO	Count	21	32	53	0.001
		% within GROUP	61.8%	94.1%	77.9%	
	YES	Count	13	2	15	
		% within GROUP	38.2%	5.9%	22.1%	
Total		Count	34	34	68	
		% within GROUP	100. 0%	100. 0%	100. 0%	

TABLE10: FREQUENCY AND PERCENTAGE OF PATIENTS WITH BUCKING

			GROUP		Total	P value
			ETT GROUP	I- GEL GROUP		
BUCKING	NO	Count	14	29	43	<0. 0001
		% within GROUP	41.2%	85.3%	63.2%	
	YES	Count	20	5	25	
		% within GROUP	58.8%	14.7%	36.8%	
Total		Count	34	34	68	
		% within GROUP	100. 0%	100. 0%	100. 0%	

FIGURE 10: COMPARISON OF COUGHING AND BUCKING



About 38% and 58% of patients experienced coughing and bucking respectively in the endotracheal tube group, compared to the I - Gel group with 22% and 36% experiencing coughing and bucking during removal of the I- Gel device. P-values are statistically significant for both variables.

About, 8. 8 percent that is 3 patients in the study group experienced desaturation (not less than 96%) during switch ove r of endotracheal tube to I- Gel. 17%, that is 6 out of 34 patients required a second attempt at insertion of I-Gel in the study group

DISCUSSION :

We ensued this prospective randomized study to compare the benefits of Bailey's manoeuvre over the conventionally followed extubation technique of the endotracheal tube.

The benefits of Bailey's manoeuvre though well known through available literature evidence, is seldom routinely employed in everyday practice probably owing to the available alternative methods to abate the extubation response such as short acting beta blockers. The brief loss of control over a secure airway elicits some degree of apprehension in the anaesthesiologists. However, this manoeuvre is expected to elicit primarily a significantly lesser pressor response at extubation which may not require interventions or rescue boluses of drugs for control of hear t rate and blood pressure. This may prove highly beneficial especially in patients such as those with hypertension or cardiovascular diseases in whom even this brief surge in haemodynamics may be detrimental.

We hypothsised that the patients undergoing deep extubation followed by I- Gel exchange and removal of the same would have lesser haemodynamic surges secondary to lesser glottic stimulation, than the patients having their airway extubated with the endotracheal tube retained t ill awakening. We also observed secondary benefits such as a probable lesser incidence of coughing, bucking, desaturation during I - Gel exchange and also the ease of insertion of I - Gel by observing the number of attempts required at insertion of the supraglottic device.

Heart rate:

In our study, we observed that there was a statistically significant less pressor response in terms of heart rate immediately after extubation and upto 10 minutes post extubation. **A.P.Kataria et al** conducted a study in 60 patients belonging to both ASA groups I and II and divided them intotwo groups similarly, one group underwent extubation as per routine and the other group underwent Bailey's manouvre with the same I- Gel and they recorded lesser heart rate, systolic, diastolic and mean blood pressure response at extubation. Additionally they administered 0.3mg/kg of Propofol prior to the device exchange after deep extubation. This was in accordance with our study. (7) **Raj Pal et al** conducted a study in sixty controlled hypertensive patients undergoing elective surgeries under general anaesthesia. Patients were randomized into two groups of thirty each, one group undergoing conventional endotracheal tube extubation and the other group where the patients had the endotracheal tube removed on a deeper plan e and it was exchanged for a Proseal Laryngeal Mask Airway. They observed a significantly lower heart rate response in the PLMA group which was their primary outcome. But they observed no difference in secondary outcomes such as systolic, diastolic or mean arterial pressures, ECG, end tidal carbon dioxide. In sharp contrast to our study, they concluded that the manoeuvre did not effectively blunt all haemodynamic responses as hypothesized. (6) **Michael S Stix et all** conducted a study in sixty patients proving the safety and ease of technique while performing the Bailey's manoeuvre with size 4 laryngeal mask. He mentions that those patients requiring a second attempt at insertion was due to insufficient depth of insertion. The second phase of this study was carried out in patients undergoing a varied array of surgeries including neurosurgeries and sternotomies and the Bailey's technique proved to be beneficial in reducing pressor response at extubation in concurrence with our study results. In this study they however confirmed the placement of laryngeal mask with the aid of a fibreoptic scope. (5)

Blood pressure:

There was a statistically significant decreased response in systolic blood pressure and mean arterial pressure rise in the I - Gel group, compared to the endotracheal group at various time intervals post

extubation. There was however only a mild decrease in diastolic blood pressure immediately post extubation and at first and sixth minute in the
study group. **Neha et all** conducted a similar comparative study in hundred patients however with Classic LMA and in ASA class 1 patients and similarly observed a significant low heart rate as well as blood pressure responses in patients where C- LMA was removed in comparison with endotracheal tube group, similar to our observations but with a different device. (4)

Desaturation:
There was not much difference in oxygen saturation between the groups at various t ime intervals. However, the study has excluded patients with anticipated or unanticipated difficult airway and those with reactive airways or long standing pulmonary diseases who are prone to desaturation at extubation.

Coughing and bucking :
The patients were observed to be less agitated and had lesser incidence of coughing and bucking during removal of I - gel. Only a few patients required a second attempt at reinsertion of the supraglottic airway without any complications. Non -specific ECG changes in the ST segment were observed in 3 patients in the endotracheal tube group. There was no significant desaturation requiring intervention that occurred during the swapping of I - Gel.
The possible limitations of our study is that we did not use bispectral index or alternative sources for monitoring of anaesthetic depth during which endotracheal tube was removed and I -Gel was swapped, this was managed by taking into observation the lack of response to oropharyngeal suctioning and the MAC level of 1 as means of ensuring obtunded reflexes under adequate anaesthetic depth. Misplaced supraglottic device in forms of inadequate depth of insertion or hinging on the aretynoids causing laryngeal trauma or evoking laryngeal spasms needs to be taken into consideration. The free passage of gastric tube ensured proper positioning of the device in our study.

This technique of Bailey's may not be universally applied such as in full stomach patients prone for aspirations, surgeries of the face and facial bones. In these patients maintenance of a safely secured airway and minimizing chances of aspiration is of utmost importance and the benefits over risks need to be analyzed. Further extended studies are required in establishing the best technique of performing the Bailey's manoeuvre as there are several techniques described in literature.

CONCLUSION :
We conclude that the pressor response in terms of increase in vital parameters such as heart rate, systolic blood pressure, and mean arterial pressure is significantly lower in the I - Gel group than in the endotracheal extubation group. Respiratory complications like coughing and bucking was also lower in the I-Gel group. Hence the Bailey's manoeuvre is a beneficial technique as an adjuvant in extubation especially in susceptible patients like hypertensives who might reap maximum benefits from it.

DECLARATION OF COMPETING INTEREST:
The authors have no competing interests to declare

DATA AVAILABILITY:
The corresponding author can provide the data of the study upon reasonable request.

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