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Original Research Article.

Comparative Hemodynamic Efficacy of Intubating LMA Fastrach and Ambu Aura –I as a Conduit for Intubation during General Anaesthesia In Adult: A Randomized, Clinical Study

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ABSTRACT

Background: Airway management continues to remain one of the most challenging tasks for the anaesthesia and critical care providers. The stress response to laryngoscopy and endotracheal intubation is associated with morbidity in susceptible individuals. Laryngeal mask airway (LMA) has revolutionized the airway management during anaesthesia.

Method: 80 patients were randomly selected and divided into two groups. Group 1-ILMA group and Group 2 –Ambu aura-I group.

Group 1- ILma was used as a conduit for intubation and hemodynamic changes were recorded.

Group 2-Ambu Aura –I was used as a conduit for intubation and hemodynamic changes were recorded.

Results and Conclusion: Hemodynamic changes in both the groups were not significant.

Keywords: ILMA, Ambu Aura-I, Endotracheal Intubation.

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INTRODUCTION

As an anaesthesiologist we spend a respectable part of our career in keeping the airway secure and using various means maintaining hemodynamic stability during this process. The stress response to laryngoscopy and endotracheal intubation is associated with morbidity in susceptible individuals.

Laryngeal mask airway (LMA), introduced in clinical practice by Dr. Archie Brain in 1981 has revolutionized the airway management during anaesthesia.[1,2] Intubating LMA and Ambu Aura I are newer second generation supraglottic airway devices used for securing airway. The hemodynamic disturbances caused by laryngoscopy can be avoided by using Supraglottic airway devices. Ambu aura-I is a new second generation magnetic resonance compatible, disposable supraglottic airway device designed to allow the passage of conventional cuffed tracheal tubes in patients of all age groups. There is paucity of literature on clinical evaluation of Ventilatory and intubation characteristics of newly introduced Ambu aura –i in adults. In view of the fact that there is paucity of literature on clinical use of Ambu aura-i® performance and clinical use in adults and only few isolated case reports along with controlled and comparative studies with other supraglottic airway devices are available, we decided to add to the initial experience and conducted this hospital based descriptive type of observational study.

METHOD

The study was conducted in Mahatma Gandhi Medical College and Hospital, Jaipur on 80 patients of age group 18-55 years of either sex to clinically compare the hemodynamic changes during insertion of ILMA and recently introduced second generation supraglottic airway device Ambu aura-i® With the approval of the institute's ethics committee and prior written informed consent, 80 consenting adult patients (ASA I and II)fulfilling all entry criteria undergoing elective major surgery requiring tracheal intubation were enrolled in this prospective randomised controlled study.

A detailed preoperative assessment was done a day before surgery with special attention to airway indices including Mouth opening, Mallampatti scoring and airway indices viz. thyromental distance, sternomental distance etc. On the day of surgery on arrival in the operation room, monitoring was setup: including ECG, non-invasive blood pressure, end-tidal carbon dioxide (E'_{CO_2}) measurement and pulse oximetry. Intravenous line was secured and patients were premedicated with Inj midazolam 0.02

mg/Kg, Inj fentanyl 1mcg/kg, inj.glycopyrrolate 0.2 mg intravenously. Before the induction of anaesthesia, patients were randomized using chit and box method for group assignment (Group 1- Control group or 2- test group; n=40 each). Intubating LMA (size 4) was used for airway management in Group 1 whereas Ambu aura I(size 4) was used in Group 2.

Pre-oxygenation with 100% oxygen was done via a facemask for 3 min. Anaesthesia was induced with intravenous propofol 2.5 mg/kg administered intravenously 60 seconds after I.V. bolus of Inj. Xylocard 1.0 mg/Kg. ILMA/Ambu aura I was inserted when the eyelash reflex had been lost and jaw was fully relaxed. Additional bolus of propofol 10-20 mg was administered if required. Further ventilation was continued with maintenance anaesthetics (N2O+Oxygen+isoflurane+Atracurium).Endotracheal tube of size 7.5mm was used for intubation and tracheal intubation was done. After the successful placement of the tracheal tube, the intubating laryngeal mask /Ambu Aura-I was removed using the stabilizing rod (or a plain tracheal tube one size smaller) for railroading the ILMA/Ambu Aura-i over it, holding the tracheal tube by other hand to prevent accidental extubation. Proper tracheal placement of the tracheal tube was confirmed and tube secured with tape. . This was the endpoint of study. Anaesthetics were stopped at the end of surgery. Reversal of neuromuscular block was done and extubation was done in the standard manner.

Haemodynamic parameters viz. heart rate, blood pressure, SpO_2 were recorded Before premedication, after premedication, After induction of anaesthesia, after insertion of airway device, after intubation, after removal of airway device.

Statistical analysis of the descriptive data was done. Between the two comparison groups were performed with a two-tailed independent *t*-test using statistical software. Intra-group descriptive data was analyzed using the paired *t*-test. Categorical data was analyzed using the χ^2 test or Fisher's exact probability test. Significance was defined as $P \leq 0.05$.

Table 1: Heart Rate statistics among the groups at different time intervals

Group		Before Premedication	After premedication	After Propofol	After ILMA/aura Insertion	After Atracurium	After Intubation-Hr	After Ilma /Aura removal -Hr
Group 1	**N**	40	40	40	40	40	40	40
	Mean	80.65	98.43	94.48	97.90	83.00	86.30	86.03
	SD	10.15	10.27	6.64	6.72	7.64	6.85	6.64
	P Value LS		<0.001S	<0.001S	<0.001S	0.246	0.005	0.006
Group 2	**N**	40	40	40	40	40	40	40
	Mean	76.33	91.45	86.65	92.03	87.15	78.58	84.98
	SD	6.62	5.62	5.59	5.96	9.99	7.78	8.04
	P Value LS		<0.001S	<0.001S	<0.001S	<0.001S	0.168	<0.001S
Total	**N**	80	80	80	80	80	80	80
	Mean	78.49	94.94	90.56	94.96	85.08	82.44	85.50
	SD	8.79	8.94	7.26	6.97	9.08	8.26	7.35
P Value LS		.027	<0.001S	<0.001S	<0.001S	.040	<0.001S	.526

Table 2: Systolic Blood Pressure statistics among the groups at different follow up period

Group		Before Premedication	After premedication	After Propofol	After ILMA/aura Insertion	After Atracurium	After Intubation-Hr	After Ilma /Aura removal -Hr
Group 1	**N**	40	40	40	40	40	40	40
	Mean	132.23	129.65	107.63	127.80	121.70	135.25	119.35
	SD	13.16	13.12	14.04	13.67	10.59	14.17	21.66
	P Value LS		0.383	<0.001S	0.144	<0.001S	0.326	0.002
Group 2	**N**	40	40	40	40	40	40	40
	Mean	130.50	127.10	107.85	126.63	120.50	134.48	120.70
	SD	13.40	11.46	11.66	10.60	9.02	13.59	8.63
	P Value LS		0.226	<0.001S	0.156	<0.001S	0.191	<0.001S
Total	**N**	80	80	80	80	80	80	80
	Mean	131.36	128.38	107.74	127.21	121.10	134.86	120.03
	SD	13.23	12.30	12.83	12.17	9.79	13.80	16.39
P Value LS		.563	.357	.938	.669	.587	.804	.715

Table 3: Diastolic Blood Pressure statistics among the groups at different follow up period

Group		Before Premedication	After premedication	After Propofol	After ILMA/aura Insertion	After Atracurium	After Intubation-Hr	After Ilma /Aura removal -Hr
Group 1	**N**	40	40	40	40	40	40	40
	Mean	82.28	80.85	69.33	76.35	76.70	85.68	79.05
	SD	8.78	10.10	9.39	12.12	9.52	9.62	15.34
		P Value LS	0.501	<0.001S	0.014	0.008	0.103	0.251
Group 2	**N**	40	40	40	40	40	40	40
	Mean	81.85	80.30	69.05	78.65	79.00	86.95	80.38
	SD	10.28	9.69	7.72	10.80	9.57	10.48	9.95
		P Value LS	0.49	<0.001S	0.179	0.203	0.031	0.518
Total	**N**	80	80	80	80	80	80	80
	Mean	82.06	80.58	69.19	77.50	77.85	86.31	79.71
	SD	9.50	9.84	8.54	11.46	9.56	10.02	12.86
P Value LS		.843	.804	.887	.373	.285	.572	.648

Table 4: Mean Arterial pressure statistics among the groups at different follow up period

Group		Before Premedication	After premedication	After Propofol	After ILMA/aura Insertion	After Atracurium	After Intubation-Hr	After Ilma /Aura removal -Hr
Group 1	**N**	40	40	40	40	40	40	40
	Mean	98.63	96.83	81.73	92.95	91.65	102.03	92.13
	SD	8.94	9.82	9.46	10.50	8.83	9.48	17.26
		P Value LS	0.39NS	<0.001S	0.011	<0.001S	0.103	0.038
Group 2	**N**	40	40	40	40	40	40	40
	Mean	97.39	95.16	80.97	94.49	92.56	103.04	94.36
	SD	9.99	9.52	8.68	9.91	8.82	9.47	8.62
		P Value LS	0.31	<0.001S	0.196	0.025	0.011	0.15
Total	**N**	80	80	80	80	80	80	80
	Mean	98.01	95.99	81.35	93.72	92.11	102.53	93.24
	SD	9.44	9.65	9.03	10.17	8.78	9.43	13.60
P Value LS		.561	.444	.712	.503	.645	.633	.467

Table 5: Mean SPO2 statistics among the groups at different follow up period

Group		Before Premedication	After premedication	After Propofol	After ILMA/aura Insertion	After Atracurium	After Intubation-Hr	After Ilma /Aura removal -Hr
Group 1	**N**	40	40	40	40	40	40	40
	Mean	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	SD	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Group 2	**N**	40	40	40	40	40	40	40
	Mean	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	SD	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**N**	80	80	80	80	80	80	80
	Mean	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	SD	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P Value LS		NA	NA	NA	NA	NA	NA	NA

RESULTS

Table 1 shows values of heart rate in the two groups at different time intervals. Premedication resulted in statistically significant increase in heart rate, which persisted even after propofol administration. Mask insertion caused significant rise in heart rate when compared to base line values in both the groups. The heart rate following tracheal intubation through the mask showed insignificant rise in both the groups when compared to baseline values. The heart rate showed significant rise after removal of ILMA/Ambu Aura-i®. The trend of between the group heart rate was not different statistically at different time intervals.(P> 0.05)

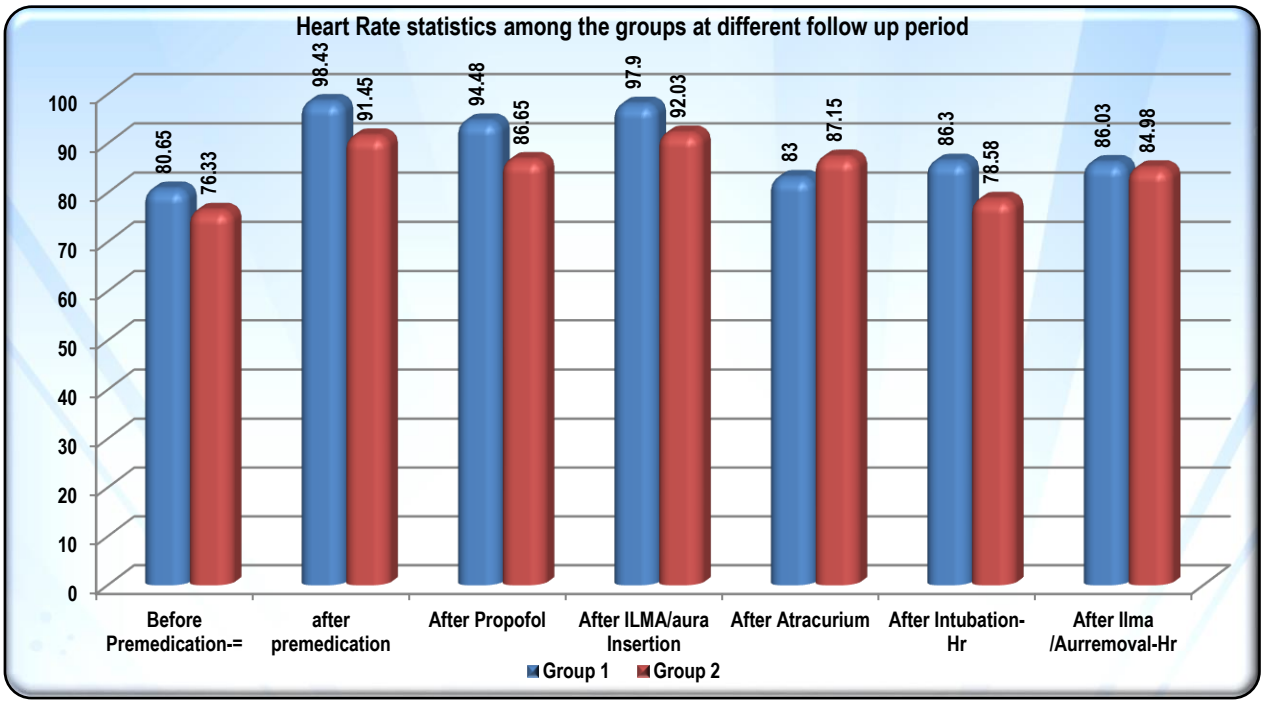
Table -2 depicts the Comparison of Mean ± S.D. of Systolic Blood Pressure at various time intervals between groups. Mean Systolic Blood Pressure was not statistically significant among the groups at different follow up period.(P>0.05)

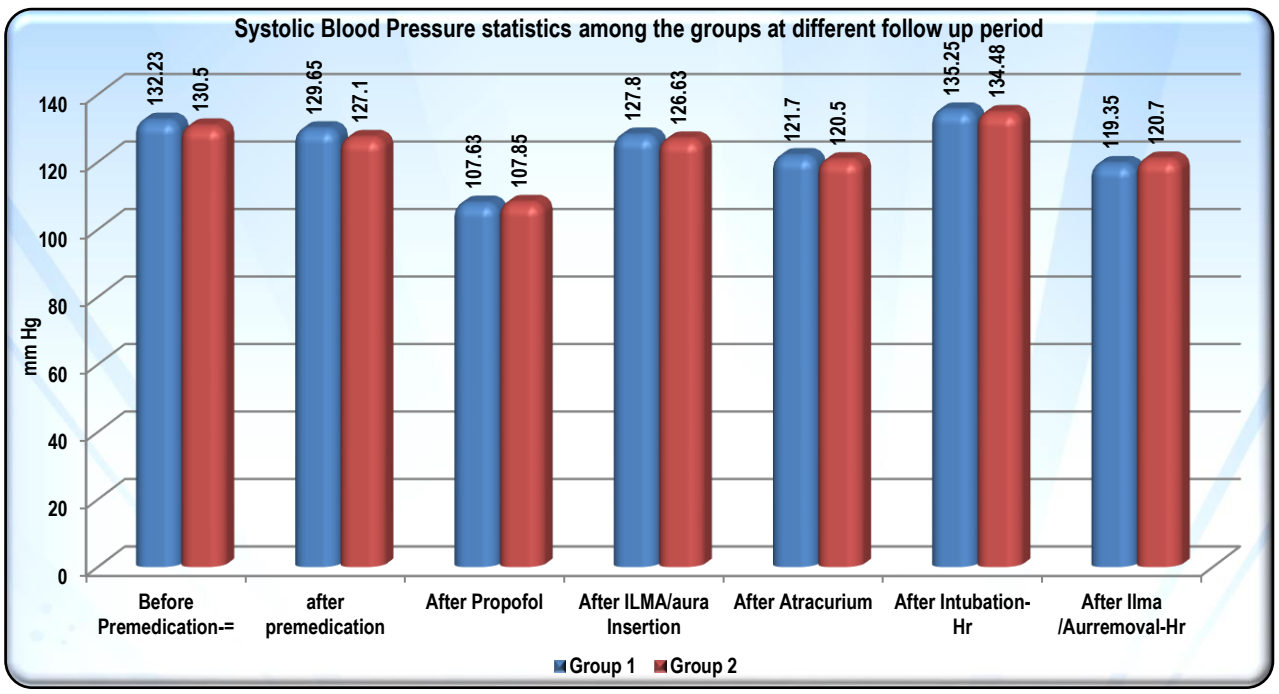
Table 3 depicts the Comparison of Mean ± S.D. of Diastolic Blood Pressure at various time intervals between groups. Mean diastolic Blood Pressure was not statistically significant among the groups at different follow up period.(P>0.05).

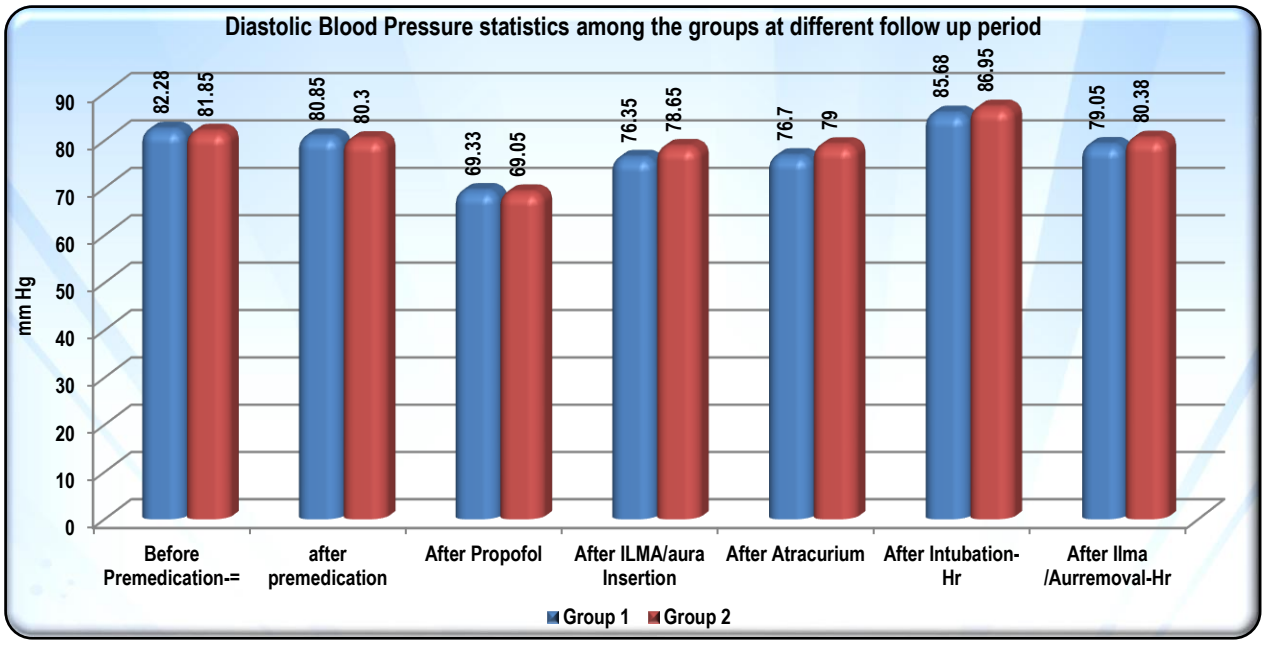
Table 4 depicts the Comparison of Mean ± S.D. of Mean Arterial Pressure at various time intervals between groups. Mean Arterial Pressure was not statistically significant among the groups at different follow up period.(P>0.05).

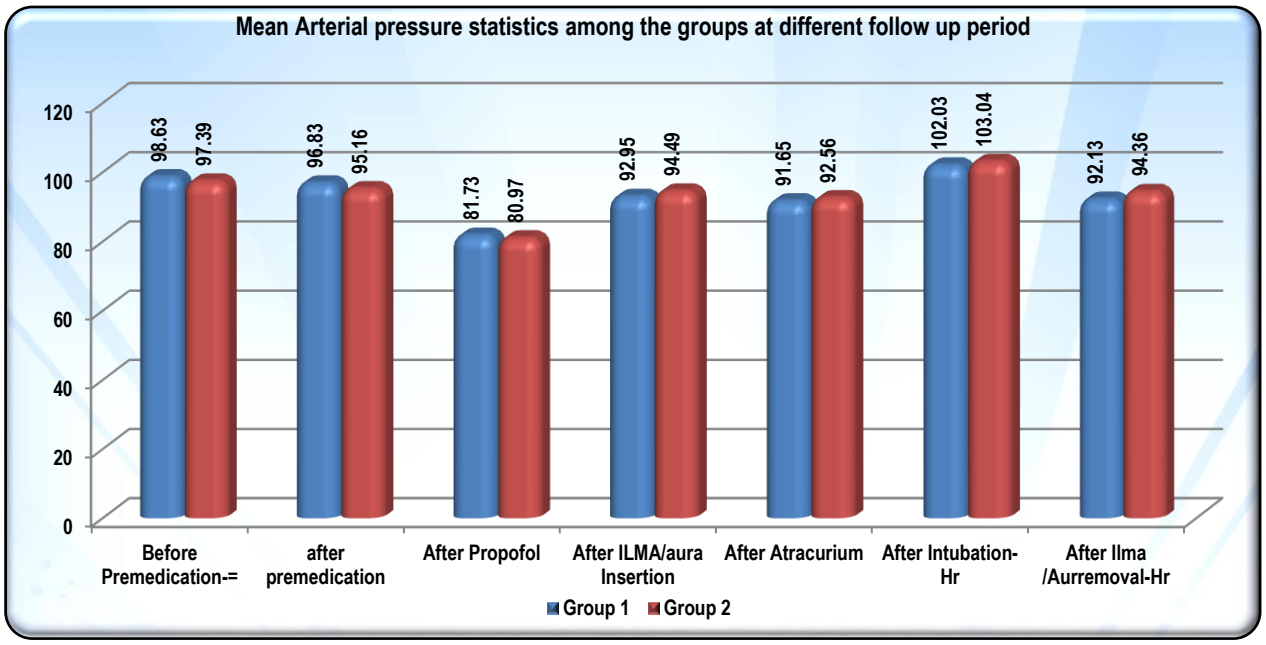
Table 5 depicts the Comparison of Mean ± S.D. of Mean SPO2 at various time intervals between groups. Mean SPO2was not statistically significant among the groups at different follow up period.(P>0.05).

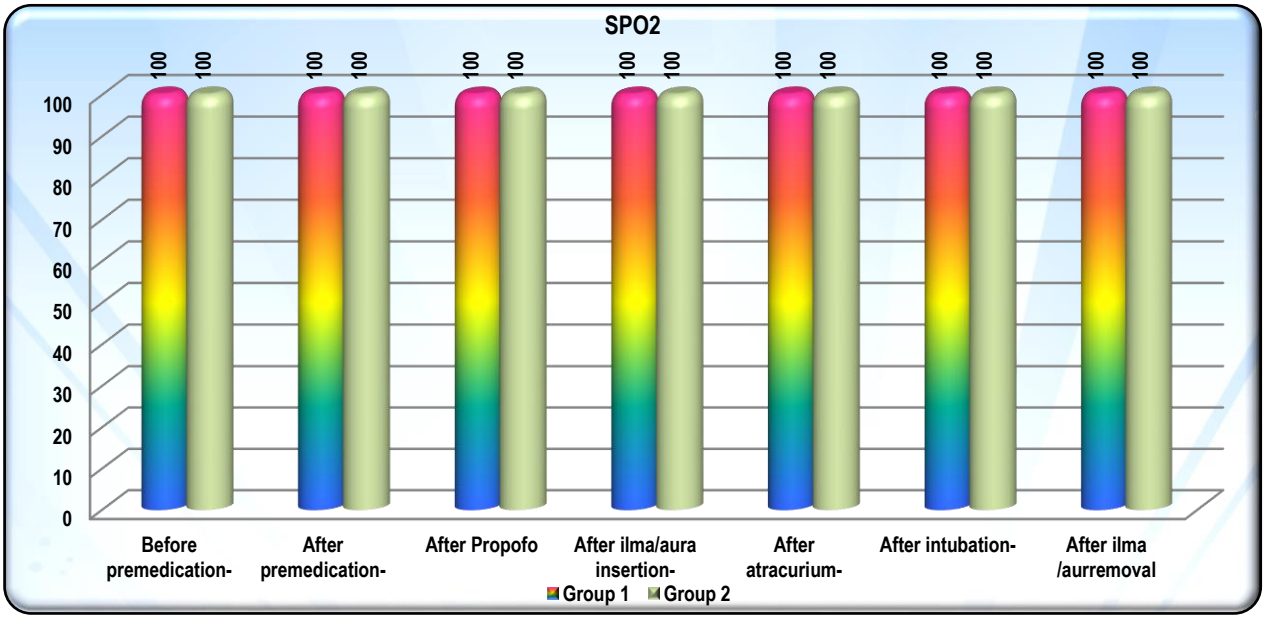
Table 5 shows SPO2 changes were insignificant in both the groups.(P>0.05).






Diastolic Blood Pressure statistics among the groups at different follow up period
mm Hg
0
10
20
30
40
50
60
70
80
90
82.28
81.85
80.85
80.3
69.33
69.05
76.35
78.65
76.7
79
85.68
86.95
79.05
80.38
Before Premedication-=
after premedication
After Propofol
After ILMA/aura Insertion
After Atracurium
After Intubation-Hr
After Ilma /Aurremoval-Hr
Group 1
Group 2


Mean Arterial pressure statistics among the groups at different follow up period
0
20
40
60
80
100
120
98.63
97.39
96.83
95.16
81.73
80.97
92.95
94.49
91.65
92.56
102.03
103.04
92.13
94.36
Before Premedication-=
after premedication
After Propofol
After ILMA/aura Insertion
After Atracurium
After Intubation-Hr
After Ilma /Aurremoval-Hr
Group 1
Group 2


SPO2
0
10
20
30
40
50
60
70
80
90
100
100
Before premedication-
After premedication-
After Propofo
After ilma/aura insertion-
After atracurium-
After intubation-
After ilma /aurremoval
Group 1
Group 2

DISCUSSION

Laryngeal mask airway has emerged as an alternative to endotracheal tube for airway management and has been recommended for airway management in emergency department also.

A shorter, wider and firm airway tube with a handle to steer the insertion are the unique features incorporated in the ILMA which promised its use as a rescue emergency airway device from unconventional positions also. Ambu Aura-i®[6] is an excellent alternative to a face mask for achieving and maintaining control of the airway during routine and emergency anaesthetic procedures in patients evaluated as eligible for a supraglottic airway, or in situations where other attempts to establish an airway have failed.[3]

In both our study groups, the mean heart rate increased after premedication. The increase was statistically significant compared to base line.

The propofol administration and the subsequent mask insertion did not significantly alter this trend. The heart rate returned towards baseline values after intubation through the mask. The differences in heart rate however were not significant statistically between the groups at different time intervals.

Basket and co-workers[4] observed the hemodynamic parameters during ILMA insertion as well as during tracheal intubation. They observed that heart rate increased slightly after ILMA insertion, significantly after intubation but neither changed while removal of ILMA.

Joo and co-workers (1999)[5] also proposed that the mean arterial pressures were higher in patients intubated through laryngoscopy.

In our study Mean Systolic Blood Pressure, Mean diastolic Blood Pressure, Mean Arterial Pressure, and Mean SPO_2 was not statistically significant among the groups at different follow up period.

Basket and co-workers[4] observed the hemodynamic parameters during ILMA insertion as well as during tracheal intubation. They observed that heart rate and blood pressures increased slightly after ILMA insertion, significantly after intubation but neither changed while removal of ILMA. Although statistically significant, cardiovascular responses were not clinically significant.

CONCLUSION

Thus we conclude that the hemodynamic changes during insertion of ILMA and Ambu aura I is insignificant. Lesser cost of Ambu aura, its availability in sizes suitable for all age groups; supply in sterile and meant for single use only dispensation, MR compatibility and availability of phthalate free version may make it more desirable and versatile ventilatory device and intubation tool for routine as well as emergency airway management.

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