Pressor Response To Introduction Of Intubating Laryngeal Mask Airway (ILMA) And Intubation Through ILMA

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ABSTRACT

Background: Laryngoscopy followed by tracheal intubation is the commonest technique of securing airway. However, laryngoscopy time more than 15 seconds leads to exaggerated pressor response. It can also result into a cardiovascular catastrophe in vulnerable elderly patients.

Materials and Methods: A prospective and randomised single centre study was conducted upon patients belonging to American Society of Anaesthesiologist (ASA) physical status I and II who were scheduled for elective surgery under general anaesthesia. Sixty (60) patients were randomly allocated to two groups (I & II) of 30 each by sealed envelope technique. In group I, conventional laryngoscopy and intubation was carried out and in group II, intubation was carried out using intubating laryngeal mask airway (ILMA), fastrach.

Results: Haemodynamic parameters (heart rate and mean arterial blood pressure) were compared between the two groups. Two tailed independent t test was used for comparison of the parameters. Rise in heart rate (HR) and mean arterial pressure (MAP) was statistically significant at stage-2 in group I (p >0.001).

Conclusion: ILMA insertion and intubation using it can be recommended for patients vulnerable to cardiovascular event.

Keywords: ILMA, fastrach, laryngoscopy, pressor response, intubation

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Introduction

Direct laryngoscopy and endotracheal intubation is the commonest technique of securing airway for general anaesthesia. Laryngoscopy time more than 15 seconds leads to tachycardia and hypertension due to rise in plasma noradrenaline level as a result of sympathetic stimulation.[1] Laryngoscopy involves distortion of airway anatomy in order to bring larynx into view.[2]

Airway management difficulty is an important cause of morbidity and mortality in anaesthesia practice.[3] Various pharmacological and non-pharmacological methods are tried to reduce pressor response of endotracheal intubation. Intubating laryngeal mask airway (ILMA) and introduction of tracheal tube through it is one of those trials. It elicits less sympathetic response as this does not distort pharyngeal structures for bringing larynx into view.

Many alternative airway management devices have come into practice over years including McCoy laryngoscope, rigid bronchoscope, flexible endoscope and light wand. All of these have been used with variable success rate.[4,5,6] ILMA is a modification of LMA classic designed for introduction of endotracheal tube through it.[7]

Materials and methods

This prospective and randomized controlled trial was carried out at a tertiary care teaching hospital spanning over 12 months after obtaining approval of Institutional Ethics Committee. Sixty (60) patients were randomly allocated by sealed envelope technique to two groups i.e. group I and group II with 30 patients in each group.

INCLUSION CRITERIA:
(i) American Society of Anaesthesiologists (ASA) I & II physical status patients
(ii) Aged between 18 - 50 years
(iii) Weighing 35 to 70 Kg
(iv) Patients with normal airway anatomy.

EXCLUSION CRITERIA:
(i) BMI >35 Kg/m^2
(ii) Cervical spine disease
(iii) Hiatus hernia patients
(iv) Gastro-esophageal reflux disease
(v) Pharyngo-esophageal pathology
(vi) Hypertension and ischaemic heart diseases

Relevant history of the patients was taken and thorough physical examination was conducted. Airway assessment was carried out preoperatively by using five bedside tests viz. Modified Mallampatti Test, thyromental distance, atlanto-occipital joint extension, interincisor gap and sternomental distance. Routine haematological and biochemical investigations were carried out. Written informed consent was taken following preanaesthesia check up. The patients

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were kept fasting over night prior to surgery. Diazepam 5 mg was given orally for anxiolysis at bed time. Vascular access was established via a peripheral vein. General anaesthesia was induced in both the groups of patients.

ANAESTHESIA TECHNIQUE:

Patients were premedicated with Inj. midazolam 0.02 mg/kg and Inj. fentanyl 1 microgram/kg intravenously. Induction was carried out with Inj. propofol 2 mg/kg intravenously. Inj. vecuronium 0.1 mg/kg was used intravenously for intubation.

Group I: Patients were intubated orally by using Macintosh laryngoscope with appropriate sized cuffed polyvinylchloride endotracheal tube.

Group II: Appropriate sized ILMA was introduced and intubation attempted through it. Endotracheal tube was readjusted at the level of incisors for maintaining bilaterally equal air entry after removal of ILMA.

Baseline pulse rate, blood pressure and peripheral oxygen saturation (SpO_2) were recorded after confirmation of effect of the muscle relaxant. Following stages for haemodynamic response were considered in group I: stage 1- following laryngoscopy, stage 2- following intubation and stage 3- once pressor response decreases, whereas in Group II: stage 1- following insertion of ILMA, stage 2- following intubation and stage 3 -once pressor response decreases. Successful tracheal intubation was confirmed by adequate chest rise and capnography.

Observations and Results

All the patients were in the age group of 21 to 50 years. Mean age of the patients in group I was 32.04±6.48 years and 31.50±7.37 years in group II. The age distribution in both the groups was as shown in table 1. The two groups were statistically comparable with respect to age using two tailed independent t test ($p > 0.05$).

Table 1: Mean Age in the two groups in years

Group	Mean	Standard deviation (SD)
I (n=30)	32.04	6.48
II (n=30)	31.50	7.37

Gender ratio of the patients in both the groups was comparable as shown in table 2.

Table2: Gender distribution in two groups

Group	Male	Female
I (n=30)	8	22
II (n=30)	7	23

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Weight of the patients ranged from 41 to 67 kg. The average weight of the patients in group I was 56±9.93 kg and 55.4±14.25 kg in group II as shown in table 3. The two groups were compared for weight using two tailed independent t test and no statistically significant difference was observed.

Table 3: Weight of patients in both the groups in kg

Group	Mean	Standard Deviation
I (n=30)	56.9	9.93
II (n=30)	55.4	14.25

The success rate of endotracheal intubation in group I was 96.66% at first attempt and 3.33% in second attempt as shown in table 4. In group II, ILMA insertion was successful at first attempt in all the cases but endotracheal intubation was achieved in 83.33% (25) cases in the first attempt, in 10% (3) cases in second attempt and in 6.66% (2) case in the third attempt as shown in table 4.

Table 4: Successful ventilation & intubation in both the groups

Group	No of attempts	Successful ventilation	Successful intubation
I N= 30	First attempt	30	29
	Second attempt	0	1
	Third attempt	0	0
II N= 30	First attempt	30	25
	Second attempt	0	3
	Third attempt	0	2

In group I, time taken for intubation was noted. In group II, time taken for insertion of ILMA to successful tracheal intubation through it was recorded. Total time taken was in the range of 10 to 26 seconds in group I and 18 to 46 seconds in group II. The mean time taken for intubation was longer in ILMA group compared to the laryngoscopy group. The difference in mean time was found to be statistically significant using two tailed independent t test ($p < 0.001$) as shown in table 5.

Table 5: Time taken to successful intubation

Group	N	Minimum (seconds)	Maximum (seconds)	Mean (seconds)	Standard deviation
I	30	10	26	14.65	4.49
II	30	18	46	28.45	7.55

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Haemodynamic parameters were compared between the two groups by using two tailed independent t test. The heart rate (HR) rose from 76±17 beats per minutes (bpm) at stage 1 to 84±11 bpm at stage 2 in group I. This increase in HR was statistically significant p<0.001. This increase in HR was not maintained throughout and it was 75±10 bpm at stage 3. However, in group II HR rose from 72±15 bpm following insertion of ILMA at stage 1 to 75±13 bpm after intubation through it at stage 2 and decreased to 69±13 bpm at stage 3. The changes were statistically insignificant. The Mean arterial pressure (MAP) in group I increased from 76.13 ±8.42 mmHg at stage I to 84.5±13.42 mmHg at stage 2 and decreased to 81.44±9.42 mmHg at stage 3. These changes in MAP were statistically significant (p<0.001). In group II, the MAP increased from 77.71±11.4 mmHg to 78.69±14.02 mmHg at stage 2 (p>0.05) which was statistically insignificant. At stage 3, the MAP slightly increased to 81.34±11.28 mmHg in group II (p<0.001). Table 6 showed the comparison of mean changes in HR and MAP observed respectively. The mean change in HR and MAP was more in group I at stage 2.

Table 6: Mean of haemodynamic parameters observed at various stages in the two groups

Group	Variable	Stage 1	Stage 2	Stage 3
I(n=30)	HR(bpm)	76±17	84±11	75±10
	MAP(mmHg)	76±9	84±13	81±9
II(n=30)	HR(bpm)	72±15	75±13	69±13
	MAP(mmHg)	77±11	78±14	81±11

HR: heart rate, bpm: beats per minute, MAP: mean arterial pressure

Complications encountered during intubation in both the groups were as depicted in table 7. Tip of ILMA was examined for traces of blood for mucosal injury. Lips were examined for any lip trauma and incidence of sore throat was recorded by asking the patients immediately in preoperative period as well as post operatively after 24 hours. The patients were enquired regarding any other complications as well.

Table 7: Complications

Complications	Group I	Group II
Mucosal trauma	1	4
Lip injury	2	3
Sore throat	3	3
Oesophageal intubation	1	4

Discussion

Airway management is an important responsibility of the anaesthesiologist. Various gadgets have been developed over a period of time for management of airway.
Laryngoscopy followed by tracheal intubation is the most commonly practiced technique of securing airway.

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ILMA is a modified LMA designed to facilitate tracheal intubation. It allows single handed insertion in any position with minimal manipulation of head and neck. It can be used as an airway management device. Ventilation and oxygenation can be continuous during intubation to prevent oxygen desaturation. These two techniques of airway management were compared in this study with respect to efficacy, intubating conditions and haemodynamic response.

In our study, tracheal intubation using laryngoscopy was successful in the first attempt in 99.66% patients and in second attempt in 3.33% patients while ILMA intubation was possible in the first attempt in 83.33% of the patients, in the second attempt in 10% of the patients and in the third attempt in 6.66% of the patients. Oesophageal intubation was seen in 3.33% of patients in group I and in 10% of the patients in group II.

In one of the initial works done by Brain to assess the performance of ILMA as a ventilatory device and blind intubation guide in 150 individuals, 100% success rate for device insertion and ventilation in first attempt was reported and tracheal intubation was possible in 99.3% of the patients. Fifty percent of the patients were intubated in the first attempt, 19% of the patients were intubated in the second attempt and 31% of the patients required 3 to 5 attempts.[7]

Chan et al. who studied efficacy of ILMA predominantly in Chinese population reported an overall success rate of 97% for blind intubation through ILMA. Fifty percent of those were intubated in the first attempt, 42% in the second attempt and 5% in the third attempt.[8] Hundred percent (100%) success rate for intubation and ventilation using ILMA was reported by Agro et al. Forty percent (40%) of those were intubated in the first attempt and rest in the second attempt.[9]

Basket et al. & Joo and Rose reported over all higher success rates and were identical for both ILMA guided and laryngoscopy guided intubation.[6, 10] Incidences of oesophageal intubation were not documented by them. Kihara et al. in their study found intubation success rate of 100% with laryngoscopy and 94% with ILMA. Fifty six percent (56%) of those were achieved in the first attempt in patients with normal airway.[11] The success rate of intubation using ILMA achieved in our study was comparable to that found by Baskett et al. who carried out a multicentric trial at 7 centres in UK on 500 ASA grade I and II patients.[6] Ventilation after insertion of ILMA was satisfactory in 95% of the patients, difficult in 4% of the patients and unsatisfactory in 1% of the patients. Intubation was successful in 96.2% case (79.8% in the first attempt, 12.4% in the second attempt and 4% in the third attempt).

Time taken for successful intubation in our study was 14.65±4.49 seconds in group I and 28.45 ±7.55 seconds in group II. This difference was statistically significant ($p<0.001$). In a study conducted by Kihara et al. successful intubation was achieved in 33 seconds using direct laryngoscopy technique while intubation through ILMA was achieved in 57 seconds.[11] In both the studies intubation using ILMA required more time as compared to intubation using

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laryngoscope since intubation through ILMA occurs through various stages which is time consuming. Avidian et al. found that the mean time for insertion of ILMA by naive intubators was 19.98 seconds though he didn't compare the results with the use of laryngoscope but on comparison with our study time taken was more than that for laryngoscopy group.[12]

As shown in the observation table 6, there was significant surge in HR and MAP at stage 2 after intubation as compared to stage 1 in group I. On the other hand, the change in HR and MAP was insignificant at stage 2 in group II. Joo and Rose reported smaller rise of MAP during ILMA insertion and intubation than direct laryngoscopy & intubation. Baskett et al. reported surge in HR and MAP which was statistically significant but of little clinical significance during ILMA insertion and intubation.[1, 6, 10]

Kihara et al. also reported similar haemodynamic changes when intubation was done via ILMA and under direct laryngoscopic vision.[11] Another study conducted by the same author found haemodynamic response to ILMA insertion, intubation and also for ILMA removal in addition to it. A significant surge in HR and MAP on ILMA insertion and immediate intubation was noted when compared with preinsertion values, whereas no change was observed when compared to preinduction values. Choyce et al. observed pressor response to intubation of similar magnitude both for laryngoscopy and ILMA insertion groups but they compared it with preinsertion values.[13] Shimod O et al. reported no appreciable haemodynamic changes on ILMA insertion and intubation when compared with preinsertion values.[14]

The incidences of mucosal trauma and lip injury were greater with ILMA as compared to laryngoscopy group. Similar findings were observed by Kihara et al.[11]. Higher incidences of mucosal injury in the ILMA group was attributed to the high pressure exerted by ILMA against pharyngeal mucosa. Shung et al. reported 67% incidences of sore throat whereas it was 10% in our study. Higher incidences of sore throat in the above study can be correlated to awake intubation technique used by the authors.[15]

Conclusion

Blind intubation using ILMA offers no special advantage over conventional laryngoscopy to the patients with normal airway anatomy in terms speed of intubation and number of intubation attempts. The haemodynamic pressor response to ILMA insertion and endotracheal intubation is less as compared to the conventional laryngoscopy and endotracheal intubation. Hence, it can be recommended for the patients in whom pressor response is not desirable. Since ventilation without intubation is possible with ILMA, it offers a good alternative in 'cannot intubate'scenario while dealing with difficult airway. However, it requires further evaluation with larger sample size.

Conflict of Interest: Nil

Sponsorship: Nil

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References

1. Usha S shah Dr, TS Jaylakshmi. Pressor response and hypertension. Indian J of Anaesthesia 2003;4:443-449

2. Mallampati SR, Gatt SP, Gugino LD et al. A clinical sign to predict difficult tracheal intubation: a prospective study. Canadian Journal of Anaesthesia 1985;32:429-34

3. Latto IP Rosen Meds. Difficult tracheal intubation. London Bailliere Tindal 1987; 99-141

4. Practice guidelines for management of the difficult airway. A report by the American Society of Anaesthesiologists Task Force on Management of the Difficult Airway. Anaesthesiology 1993 Mar; 78:597-602

5. Barton CR, Stene JK. Appropriate techniques for airway management of emergency patients with suspected spinal cord injury. Anaesthesia Analgesia 1998;67:714-15

6. Baskett PJ, Parr MJA and Nolan JP. The intubating laryngeal mask results of a multicentre trial with experience of 500 cases. Anaesthesia 1998;53:1174- 79

7. Brain ALJ, Varghese C, Addy EV et al. The intubating laryngeal mask II. A preliminary clinical report of a new means of intubating the trachea. BJA 1997;79:704-9

8. Chan YW, Kong CF, Kong CS, Hawang NC. The intubating LMA initial experience in Singapore. BJA 1998; 81:610-11

9. Agro F, Brimacombe J, Carassiti M et al. The ILMA clinical appraisal of ventilation and blind tracheal intubation in 110 patients. Anaesthesia 1998;53:1084-90

10. Joo H, Rose DK.Fastrach a new laryngeal mask airway successful use in patients with difficult airways. Canadian Journal of Anaesthesia 1988;45:253

11. Kihara S, Watanabe S, Yaguchi N, Suga A, Biracombe J. Tracheal intubation with the Macintosh laryngoscope versus ILMA in adults with normal airway. Anaesthesia intensive care 2000; 28: 281-86

12. Avidan MS, Harvey A, Chitkara N, Ponte J. ILMA airway compared with direct

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laryngoscopy. BJA 1999; 83: 615-17

13. Choyece A, Avidan MS, HarveyA, Patel C. The cardiovascular response to insertion of the ILMA. Anaesthesia 2002; 57:330-333

14. Shimod O, Yoshitake A, Chitkara N, Ponte J. ILMA compared with direct laryngoscopy. BJA 1999; 83:615-17

15. Shung J, Avidan MS, Ing R, Klein DC and Pott L. Awake intubation of the difficult airway with ILMA. Anaesthesia 1998;53:645-9