Clinical Appraisal of Intubating Laryngeal Mask Airway (ILMA) for blind endotracheal intubation in the patients undergoing Spine or Orthopaedic Surgery under General Anaesthesia

A Shetty, P Shroff, L Chaudhari, R Prashanth

Citation

A Shetty, P Shroff, L Chaudhari, R Prashanth. *Clinical Appraisal of Intubating Laryngeal Mask Airway (ILMA) for blind endotracheal intubation in the patients undergoing Spine or Orthopaedic Surgery under General Anaesthesia*. The Internet Journal of Anesthesiology. 2005 Volume 10 Number 2.

Abstract

Background and Objective: The Intubating Laryngeal mask Airway (ILMA) is a new device designed to have better intubating characteristics than the standard LMA. The aim of our prospective study in a teaching hospital was to investigate the utility of ILMA for blind endotracheal intubation in patients undergoing spine or orthopaedic surgery under general anaesthesia.

Methods: 75 American Society of Anaesthesiologists (ASA) physical status I and II adult patients were examined and ILMA was inserted as per the standard technique. The lubricated endotracheal tube was then passed through the ILMA. After confirmation of the successful endotracheal intubation, ILMA was removed as per the described technique. Ease of mask ventilation, time required for insertion of ILMA, number of attempts required for insertion of ILMA, time required to achieve intubation, number of attempts required for blind endotracheal intubation and haemodynamic parameters were recorded. Complications such as trauma, postoperative sore throat, lip or dental injury were looked for. Statistical analysis was done with the paired-t-test for haemodynamic parameters and percentages were calculated for the other parameters.

Results: In spite of 32% of patients having restricted and nil neck movements, ILMA was inserted in 76% and 20% patients in first attempt and second attempt respectively. We could successfully intubate through ILMA in 96% patients with 58% in the first attempt. Haemodynamic parameters were clinically not significant.

Conclusion: ILMA is a useful tool in patients with anticipated difficult airway especially in patients with cervical spine pathology. Blind endotracheal intubation through ILMA is easy.

The paper was presented at the Maharashtra State Conference of Indian Society of Anaesthesiologists (MISACON 2004) in August 2004 and was awarded 3rd prize in the teacher's category.

INTRODUCTION

The difficult airway remains an important cause of morbidity and mortality in anaesthesia and a challenge to the anaesthesiologist. Using the Laryngeal Mask Airway (LMA) electively or emergently in patients with difficult airway now represents a recognized alternative in the American Society of Anesthesiologists (ASA) Difficult Airway algorithm. The Intubating LMA (ILMA) is designed to provide a superior conduit for blind or fibreoptically guided endotracheal intubation than the standard LMA [1].

METHODS

After obtaining approval from the institutional ethics committee and informed consent from the patient, we examined 75 ASA physical status I and II adult patients scheduled to undergo spine or orthopaedic surgery. The patients who were less than 18 years old, who had cardio-respiratory disease or cerebrovascular disease, history of sore throat within 10 days and who were at the risk of aspiration were excluded from the study. Demographic data such as age, gender and weight were recorded. Mallampatti score and neck extension were analyzed preoperatively. Limited neck extension and Mallampatti score III or IV were

considered as anticipated difficult intubation. Monitoring used were ECG, blood pressure, pulse oximetry and capnography. All patients were anaesthetized using standard general anaesthesia technique. It consisted of sedation with midazolam 0.03 mg/Kg and analgesia with fentanyl 2µg/Kg, induction with thiopentone sodium 3-5 mg/Kg and vecuronium 0.1 mg/Kg as the relaxant. Anaesthesia was maintained with oxygen, nitrous oxide, vecuronium and isoflurane. ILMA was inserted by an experienced and qualified (post MD) anaesthesiologist as per the standard technique and confirmed for its proper position. Introduction and removal of the ILMA and tracheal intubation through it were performed using the standard technique described.

TECHNIQUE OF INSERTION

The device is inserted with the patient's head and neck in neutral position. The lubricated tip of the fully deflated mask is placed behind the upper incisor teeth and describes an arc as it is introduced, following the arc of hard and soft palate to locate in the hypopharynx. The cuff is inflated and the ventilation is confirmed. The lubricated silicone endotracheal tube (7.0 in females and 8.0 in males) designed for blind intubation through the ILMA is passed. A transverse marker on the tracheal tube indicates the point at which it is about to emerge from under the epiglottis elevating bar. After confirmation of successful endotracheal intubation, the cuff of ILMA is deflated and the endotracheal tube connector removed. The ILMA is removed while the endotracheal tube is retained in place by the tube stabilizer. The endotracheal tube connector is placed and connected to the ventilation system. If resistance is felt, the tracheal tube is withdrawn to one cm beyond the epiglottis elevator bar. The following manoeuvres were used:

1. Extension manoeuvre: Pulling the handle back towards the intubator
2. Up-down manoeuvre: Withdrawal of ILMA by 5cm followed by reinsertion
3. Optimization manoeuvre: Manual ventilation performed and position adjusted until optimal seal obtained
4. Head–neck manoeuvre: Flexing of neck and extending the head (not in patients with cervical spine pathology).3

Study criteria in relation to the insertion of the ILMA, ease of mask ventilation, time required for insertion of ILMA, number of attempts, time to achieve intubation and number of attempts required for blind endotracheal intubation (maximum three attempts permitted) were recorded. Haemodynamic parameters like pulse and systolic blood pressure were recorded: before insertion of ILMA, after insertion of ILMA and after tracheal intubation at zero, one and two minutes. As only 7.0, 7.5 and 8.0 size silicone endotracheal tubes are available with the ILMA, in male patients a 9.0 size endotracheal tube was then exchanged using the tube exchanger. Complications such as trauma, postoperative sore throat, lip or dental injury were looked for. Statistical analysis was done with the paired‘t' test for haemodynamic parameters and percentages were calculated for the other parameters.

RESULTS

75 patients belonging to ASA physical status I and II, undergoing spine or orthopaedic surgery under general anaesthesia were studied. Demographic data was as listed in table 1.

Figure 1

Table 1: Demographic Data

		Mean	SD
Age (years)		40.61	15.89
Weight (Kg)		56.97	11.61
		Number	%
Gender	Male	52	69
	Female	23	31
Total		75	

Figure 2

Table 2: Site of Surgery

	Number	%
Cervical Spine	26	36
Thoracic Spine	10	13
Lumbar Spine	28	37
Upper Limb	7	9
Lower Limb	4	5
Total	75	

In 36% patients, site of surgery was at the cervical spine, 13% at the thoracic spine, 37% at lumbar spine and the remaining 14% were operated for limb surgeries (Table 2).

Figure 3

Table 3: Airway Evaluation

Thyromental Distance (cm)	Mean ± SD	6.17 ± 0.37
Mallampatti Scoring	Number	%
Score I	43	57
Scoree II	26	35
Score III	6	8
Total	75	
Neck Collar		
Yes	4	5
No	71	95
Total	75	
Neck Extension		
Not Possible	4	5
Limited	20	27
Good	51	68
Total	75	

On airway evaluation 8% had Mallampatti score III, 35 % had Mallampatti score II and 57 % had Mallampatti score I. The mean thyromental distance was 6.17 ± 0.37 which is within normal limits. Neck extension was not possible in 5% of patients because of the presence of cervical collar, limited in 27% patients and in remaining 68% patients it was good. This is shown in Table 3.

Figure 4

Table 4: Mask Ventilation

	Number	%
Easy	47	63
Moderate	25	33
Difficult	3	4
Total	75	

Figure 5

Table 5: ILMA Insertion Characteristics

Time (sec)		Mean ± SD	14.07 ± 11.62
		Number	%
Attempts	Failed	2	3
	1	57	76
	2	15	20
	3	1	1
Total		75	

ILMA insertion was successful in over 97% patients in spite of 32% of patients having restricted and nil neck movements. In 76% patients ILMA was inserted in first attempt, 20 % in second attempt and one patient needed three attempts.

Figure 6

Table 6: ETT Insertion Characteristics

Time (sec)		Mean ± SD	19.08 ± 12.85
		Number	%
Attempts	Not attempted	2	3
	Abandoned	1	1
	1	44	58
	2	20	27
	3	8	11
Total		75	

In spite of 32% patients having restricted and nil neck movements and 8% having Mallampatti score III, we could successfully intubate through ILMA in 96% patients. Most of them (58%) were intubated in first attempt. Endotracheal intubation attempts were more when ILMA insertion required more than one attempt.

Experience showed that intubation was likely to be successful if the handle of the ILMA was finely adjusted to the optimal position where there was least resistance to manual IPPV. Size 4 ILMA was big for two patients while in one patient it was small.

Figure 7

Table 7: Haemodynamics

Mean ± SD	Pulse	p value (Paired)	SBP	p value (Paired)
Pre ILMA	83.39 ± 12.29		125.83 ± 17.09	
Post ILMA	89.40 ± 12.71	<0.0001***	131.19 ± 14.43	0.0047**
Post intubation 0min	90.94 ± 14.19	<0.0001***	135.53 ± 17.82	0.0003***
Post intubation 1min	86.29 ± 12.08	0.0368*	123.31 ± 14.83	0.3072
Post intubation 2min	82.50 ± 10.97	0.5156	116.81 ± 13.68	0.0002***

(* p<0.05 significant ** p<0.01 very significant ***p<0.001 highly significant)

As shown in table 7, haemodynamics were acceptable. Mean heart rate and systolic blood pressure increased slightly after insertion and intubation but the values are clinically not significant.

In four patients mucosal trauma was seen. No patient complained of sore throat.

DISCUSSION

Difficult laryngoscopy and intubation is as high as 20% in patients with cervical spine disease or injury. Most anaesthesiologists use simple bedside assessments to assess the likelihood of difficult laryngoscopy, most commonly Samsoon and Young modification of Mallampatti classification. Unfortunately 30% of patients who prove to be difficult will not be predicted using this assessment. No test is specific or sensitive enough accurately to predict all difficult intubations. The priority remains to provide adequate training and equipment to manage the unexpected failure[2].

The standard LMA has been used to facilitate blind endotracheal intubation in numerous situations where laryngoscope and conventional intubations have been difficult but it suffers from the disadvantage that its airway tube is too long and narrow to act as an acceptable guide for

intubation in every case.

The success rate of blind intubation through standard LMA ranges from 37% to 97%. Hence ILMA has been specially designed to increase the success rate of blind intubation. The success rate of blind intubation through the ILMA in two studies published on 150 and 100 patients, blind tracheal intubation was possible in 99.3% and 93% patients respectively[2]. In our study it was possible to intubate in 96% of the patients.

The mean time taken to insert the ILMA was14.07 seconds and ILMA insertion was successful in 97% patients. The mean time for successful intubation via the ILMA was 19.08 seconds and successfully intubated in 96% patients. In one patient we could ventilate but could not intubate as the seal may not have been adequate. Probably size 4 ILMA was small for this patient as he was obese. However, we could ventilate this patient, though intubation was not possible. In two patients we could not insert the ILMA probably the size 4 ILMA was big for these patients. Our data shows that ILMA is quick and simple to insert and forms an adequate seal for positive pressure ventilation. These results are parallel with the work done by F. Agro et al[4].

ILMA like the standard LMA can be placed from a variety of positions, the operator need not be at the head end of the patient. It can be placed with the head and neck in neutral position and therefore extremely useful in patients with cervical spine pathology. There is no need to visualize the larynx and consequently there is negligible cervical spine movement during placement[5]. Mouth opening of two cm is needed to accommodate the ILMA.

In patients undergoing cervical spine surgery data regarding restricted neck movements, ILMA insertion and attempts taken for intubation was studied. In 24 of the 26 patients undergoing cervical spine surgery, we could insert ILMA and endotracheal intubation was possible in all these 24 patients. In a study done by Koichi Nakayama, insertion of ILMA was successful in all patients, however ten patients required two attempts to obtain adequate ventilation in patients undergoing cervical spine surgery without manipulating head. In 24 of 40 patients intubation was successful on the first attempt; where as four patients had failed intubation. Blind intubation was possible in ten patients with a stabilizing device[5]. During the course of the study, we had a patient with rheumatoid arthritis who had a flexed neck. The angle at the back of the tongue was likely to be less than 90°, although we could not measure it accurately. It was possible to put ILMA and blindly intubate with a smaller size tube in this patient. With conventional laryngoscopy, we could not even visualize the epiglottis.

Mean heart rate and systolic blood pressure increased slightly after insertion and intubation but the values were clinically not significant. Circulatory response to direct laryngoscopy and tracheal intubation was first described in 1951. Haemodynamic response to the insertion of conventional LMA is less than that of laryngoscopy and tracheal intubation[2]. It has been shown that placement of the ILMA is associated with reduced stress response compared to conventional laryngoscope intubation and is likely to be advantageous in patients suffering from hypertension and ischaemic heart disease. It is possible that tracheal intubation through ILMA may be less stimulating than conventional laryngoscopy[7].

In a study done by Koichi Nakayama, postoperative sore throat and hoarseness occurred in 32.5% and 22.5% patients respectively and in all cases they were transient[5]. In our study, four patients had mucosal trauma. Of these four patients, two patients were in whom procedure was abandoned.

CONCLUSION

ILMA is a useful tool in patients with anticipated difficult airway especially in cervical spine pathology. Blind endotracheal intubation through ILMA is easy with minimal complications. Ease of placement without head and neck manipulation and without the need for the rescuer to be positioned behind the head or insert fingers in together with its ability to serve as a sole airway suggests a role in emergency medicine. This role is made more attractive by the possibility of being able to insert an appropriate sized ETT through the device without first having to remove it. Finally ILMA permits continued ventilation during intubation attempts.

ACKNOWLEDGEMENT

We thank the Dean, Dr N.A. Kshirsagar in permitting us to publish this article.

CORRESPONDENCE TO

Dr Shroff Prerana P. 126/5, Peaceland CHS Ltd, Prabhat Colony, 7th Road, Santacruz East, Mumbai 400055, Maharashtra, India. Tel No: 91-22-26114150, 0-9869117027 Email: preranaps@rediffmail.com

References

1. Ferson DZ, Rosenblatt WH, Johansen MJ, etal. Use of Intubating LMA in 254 patients with difficult to mange airways. Anesthesiology 2001; 95: 1175-81.
2. Baskett PJ, Parr MJ, Nolan JP. The intubating Laryngeal mask: results of multicentric trial with experience. Anaesthesia 1998; 53:1174-1179.
3. Kihara S, Watanabe S, Taguchi n, Suga A etal. A Comparison of blind and light wand- guided tracheal intubation using the intubating laryngeal mask. Anaesthesia 2000; 55: 427-431.
4. Agro F, Brimbacombe Carassiti M. The intubating laryngeal mask: Clinical appraisal of ventilation and blind tracheal intubation in 110 patients. Anaesthesia 1998; 53: 1084-1090
5. Nakazama K, Tanaka N, Ishikawa S. Using the intubating laryngeal mask airway for blind endotracheal intubation in patients undergoing cervical spine operation. Anaes-Analg 1999; 89:1319-21.
6. Asai T, Shinghu K. Tracheal intubation through the intubating laryngeal mask in a patient with a fixed flexed neck and deviated larynx. Anaesthesia 1998; 53: 1199-1208.
7. Brain A, Verghese, Addy EV, Kapila A. The Intubating Laryngeal Mask: development of new device for intubation of the trachea. Br. J. Anaesth 1997; 79: 699-703.

Author Information

Anita N. Shetty, M.D.
Associate Professor, Department of Anaesthesiology, Seth GSMC & KEMH

Prerana P. Shroff, M.D.
Associate Professor, Department of Anaesthesiology, Seth GSMC & KEMH

Latha S. Chaudhari, M.D.
Professor & Head, Department of Anaesthesiology, Seth GSMC & KEMH

R. Prashanth, M.B.B.S.
Resident, Department of Anaesthesiology, Seth GSMC & KEMH