



COMPARATIVE STUDY OF HAEMODYNAMIC RESPONSES, EASE OF INTUBATION AND COMPLICATIONS USING CONVENTIONAL LARYNGOSCOPE AND LIGHTWAND DEVICE-A CLINICAL STUDY

Anaesthesiology

Dr Vinita lipton Ex MD Resident Anaesthesiology Department GMC Bhopal.

Dr Rajni thakur* Designated Associate Professor Anaesthesiology Department GMC Bhopal.
*Corresponding Author

Dr Bhawna Dubey Ex MD Resident Anaesthesiology Department GMC Bhopal.

ABSTRACT

Background: The lightwand is a gentle, safe and effective intubating technique and is unaffected by the presence of blood and secretions in the upper airway. The incidence of hemodynamic responses, dental trauma, mucosal injuries are lesser as compared to conventional laryngoscopy as epiglottis is not lifted to visualize the glottis. Conventional laryngoscopy is quick and easy technique. Time and attempts taken for intubation are less as compared to lightwand. **Methods:** The present prospective randomized study was done in 100 patients of ASA grade 1 and 2, age ranging from 20- 60 yrs, mallampatti grade 1 and 2 scheduled for different elective surgeries under general anesthesia requiring endotracheal intubation were allocated into the two groups of 50 patients each.

Group LWI - Patients intubated with Lightwand (n-50).

Group DLI - Patients intubated with Direct laryngoscope (n-50).

Perioperative vitals like heart rate, blood pressure, saturation, ECG were recorded.

Result: The hemodynamic responses (heart rate, blood pressure) dental trauma and mucosal injuries after intubation with lightwand are less as compared with conventional laryngoscopy. Time taken and no. of attempts taken for intubation are more in lightwand than conventional laryngoscopy.

Conclusion : The lightwand is a gentle, safe and effective intubating technique and is unaffected by the presence of blood and secretions in the upper airway. The incidence of hemodynamic responses, dental trauma, mucosal injuries are lesser as compared to conventional laryngoscopy.

KEYWORDS

INTRODUCTION

Laryngoscopy defined as the endoscopic view of the larynx. The success of intubation by laryngoscopy depends largely on the experience of the intubator and the patient's upper airway anatomy. Occasionally, however, even in the hands of experienced anaesthesiologist, intubation by direct vision can be difficult or impossible. Endotracheal intubation using laryngoscope is frequently associated with an increase in arterial blood pressure and heart rate⁽¹⁾.

The organs involved in this sympathetic response to laryngoscopy and endotracheal intubation are base of tongue, epiglottis, soft palate, pharynx and larynx, which are extensively innervated by autonomic nervous system⁽²⁾. Stimulation of these areas, causes reflex increase in sympathetic activity leads to increase in catecholamines concentration which causes various cardiovascular changes mainly in the form of hypertension, tachycardia and dysarrhythmias⁽³⁾.

It has adverse effects on the vital systems of the body like respiratory, neurological and cardiovascular systems which causes coughing, laryngospasm, bronchospasm, vomiting and pulmonary aspiration and increase in intracranial and intraocular pressure⁽⁴⁾.

It is possible to reduce these harmful and undesirable hemodynamic responses to intubation by using different intubation techniques or pharmacological agents.

Over the years, new devices have been developed to successfully intubate the trachea and thereby provide useful alternatives to the standard technique of intubation using the laryngoscope. One of these devices is the lightwand⁽⁵⁾.

The lightwand is a lighted stylet. It utilizes the principle of transillumination of the soft tissues of the anterior neck to facilitate tracheal intubation⁽⁶⁾. Use of lightwand to intubate is expected to cause less adrenergic stimulation and sympathetic overactivity because elevation of epiglottis by laryngoscope blade is not required⁽⁷⁾. Also, since it is a gentle technique not involving much manipulation of the soft tissues the incidence of sore throat and mucosal injuries are also reported to be lesser than laryngoscopic intubation⁽⁸⁾.

Present study was aimed to compare the hemodynamic responses, ease of intubation and complications in normotensive adult patients with normal airways by direct laryngoscopy and lightwand device.

MATERIALS AND METHODS

The present prospective randomized study was conducted in department of Anesthesiology, GMC Bhopal and associated Hamidiya in 100 patients of ASA grade 1 and 2, age ranging from 20- 60 yrs, mallampatti grade 1 and 2 scheduled for different elective surgeries under general anesthesia requiring endotracheal intubation were allocated into the two groups of 50 patients each. After obtaining Institutional Ethical Committee approval and written informed consents, patients posted for various elective surgeries requiring general anesthesia were selected.

Exclusion criteria :

-Patient suffering from

1. Hypertension
2. Cardiopulmonary disease
3. Hepatic, renal and endocrine disorder
4. Difficult airway or mallampatti grade 3 or 4
5. ASA grade 3 and 4

Sample size : 100 patients

- Group LWI - Patients intubated with Lightwand (n-50).
- Group DLI - Patients intubated with Direct laryngoscope (n-50).

Method :

In the operation theatre, IV line, pulse oximeter, ECG and a non invasive BP monitor were attached.

Pre Induction Parameters: HR, SBP and DBP were noted.

Patients were premedicated with
Inj. Ondansetron 0.08mg/kg,
Inj. Glycopyrrolate 0.01mg/kg,
Inj. Midazolam 0.05mg/kg,
Inj. Pentazocine 0.3mg/kg.

Preoxygenation was done for 3 minutes with 100% oxygen.

Anesthesia was induced with Inj. Propofol 2mg/kg.

Inj. Succinylcholine 2mg/kg was used for facilitation of induction and muscle relaxation.

Post Induction Parameters: HR, SBP and DBP were noted.

- Patients in group DLI were intubated in "SNIFFING POSITION".
- Patients in groups LWI were intubated in "NEUTRAL POSITION".
- The number of intubation attempts and the duration of intubation

were also noted.

Post-intubation Parameters: HR, SBP and DBP were noted every minute till 5 minutes.

After the completion of surgery neuromuscular blockade was reversed with Inj. Neostigmine 0.05mg/kg and Inj. Glycopyrrolate 0.01mg/kg.

Sore throat, broken teeth, soft tissue edema, bleeding from gums or lips, stridor or hoarseness and any other complications were noted post operatively.

OBSERVATIONS

Table 1 – Mean Heart Rate At Various Time Intervals (beats/minute)

Time interval	Heart Rate				P value
	Group DLI		Group LWI		
	Mean	SD	Mean	SD	
Baseline	79.67	7.32	78.43	5.68	0.6358 (NS)
Preinduction	81.47	7.40	80.43	6.01	0.7659 (NS)
Postinduction	84.3	7.28	83.07	5.84	0.5105 (NS)
Postintubation	106.87	5.92	90.57	6.20	<0.01 (HS)
1 Min	104.83	5.60	88.37	5.77	<0.01 (HS)
2 Min	100.67	4.85	86.57	5.45	<0.01 (HS)
3 Min	96.87	5.00	83.67	5.01	<0.01 (HS)
4 Min	92.97	4.35	79.63	4.64	<0.01 (HS)
5 Min	88.73	4.57	79.30	4.09	<0.01 (HS)

Table 1 :

There were no statistically significant differences in heart rate at preinduction and postinduction periods amongst the two groups.

Group DLI had the greatest rise in heart rate after intubation and difference in heart rate was statistically highly significant ($P < 0.01$) as compared with the other groups at 1, 2, 3, 4, and 5, minutes postintubation.

Table 2 – Systolic Blood Pressure At Various Time Intervals (MMHG)

Time interval	Group DLI		Group LWI		P value
	Mean	SD	Mean	SD	
Baseline	125.67	6.92	122.73	6.51	0.6358 (NS)
Preinduction	121.47	6.40	120.37	6.65	0.7659 (NS)
Postinduction	114.34	7.28	112.37	5.30	0.5105 (NS)
Postintubation	134.87	5.92	129.33	6.42	<0.01 (HS)
1 Min	138.83	5.60	128.20	5.65	<0.01 (HS)
2 Min	135.67	4.85	126.07	5.09	<0.01 (HS)
3 Min	134.87	5.00	125.23	4.58	<0.01 (HS)
4 Min	132.97	4.35	125.87	4.26	<0.01 (HS)
5 Min	129.73	4.57	124.77	4.22	<0.01 (HS)

Table2:

There were no statistically significant differences in mean SBP at preinduction and postinduction periods amongst the two groups.

Group DLI had the greatest rise in mean SBP after intubation and difference in mean SBP was statistically highly significant ($P < 0.01$) as compared with the other group at 1, 2, 3, 4, and 5 minutes postintubation.

Table 3 – Diastolic Blood Pressure At Various Time Intervals (MMHG)

Time interval	DBP				P value
	Group DLI		Group LWI		
	Mean	SD	Mean	SD	
Baseline	80.23	4.50	79.60	4.31	0.8592 (NS)
Preinduction	78.40	4.08	78.03	3.96	0.7029 (NS)
Postinduction	74.93	4.02	74.57	3.98	0.8387 (NS)
Postintubation	97.37	4.77	89.90	4.38	<0.01 (HS)
1 Min	94.70	4.74	86.87	4.45	<0.01(HS)
2 Min	91.70	4.43	83.83	4.33	<0.01 (HS)
3 Min	88.50	4.29	82.37	3.90	<0.01 (HS)
4 Min	84.50	4.04	81.87	3.83	<0.01 (HS)
5 Min	79.70	4.19	76.73	3.85	<0.01 (HS)

Table 3 :

There were no statistically significant differences in mean DBP at

preinduction and postinduction periods amongst the two groups.

Group DLI had the greatest rise in mean DBP after intubation and difference in mean DBP was statistically highly significant ($P < 0.01$) as compared with the other two groups at 1, 2, 3, 4, and 5 minutes postintubation.

Table 4 – Total Time Taken For Intubation

	GROUP DLI Mean $\pm$ SD	GROUP LWI Mean $\pm$ SD	P VALUE
TIME (Seconds)	18.80 $\pm$ 1.97	26.21 $\pm$ 2.06	<0.01 (HS)

Total time taken for intubation was significantly higher in Group LWI (26.21 $\pm$ 2.06 seconds) as compared to group DLI (18.80 $\pm$ 1.97 seconds). ($p < 0.01$)

Table 5 – Number Of Attempt Taken For Intubation

	GROUP DLI Mean $\pm$ SD	GROUP LWI Mean $\pm$ SD	P VALUE
No.of attempts	1.06 $\pm$ 0.06	1.14 $\pm$ 0.09	<0.01 (HS)

Total Number of attempts in group DLI (1.06 $\pm$ 0.06) and in group LWI (1.14 $\pm$ 0.09).

Table 6 – Complications

COMPLICATIONS	GROUP DLI		GROUP LWI	
	N	%	N	%
SOFT TISSUE INJURY	5	10	2	4
TEETH INJURY	2	4	0	0
SORE THROAT	2	4	1	2
HOARSENESS OF VOICE	4	8	3	6

Soft tissue injury -DLI-10% LWI-4%

Teeth injury -DLI-2% LWI- none

Sore throat -DLI-4% LWI-2%

Horseness of voice-DLI-8% LWI-6%

DISCUSSION

Laryngoscopy and intubation using conventional laryngoscope has been the standard technique for securing the airway in operation theatre. But laryngoscopy causes profound stress response leading to hypertension, tachycardia and dysrhythmias.

There are several studies focusing on the use of pharmacological agents for blunting this stress response. However, there is only little information regarding the influence of using alternative endotracheal tube guiding devices such as fiberoptic scope, light wand and LMA.

The lightwand is gentle, safe and effective intubating technique and is unaffected by the presence of blood and secretions in the upper airway. The incidence of dental trauma and mucosal injuries, hemodynamic responses are lesser as compared to the direct laryngoscopy as epiglottis is not lifted to visualize the glottis.

This study was conducted with the aim of comparison of haemodynamic response, ease of intubation and complications using lightwand and conventional laryngoscopy in normotensive patients of either sex ranging from 20 to 60 years of age belonging to ASA grades 1 and ASA grade 2.

The differences in haemodynamic parameters heart rate, systolic blood pressure and diastolic blood pressure remained highly significant for the first five minutes in the post intubation period.

Kimura A1, Yamakage M, Chen X, Kamada Y, Namiki A et al (2001) studied the use of the lightwand technique and conventional laryngoscope to compare hemodynamic changes after tracheal intubation in 60 normotensive and hypertensive patients and concluded that tracheal intubation with a lightwand can attenuate hemodynamic changes and reduce the incidence of sore throat in comparison with the conventional laryngoscope in both the groups.

Nishikawa K1, Kawamata M, Namiki A et al (2001) conducted a study to compare the effects of the lightwand and fiberoptic techniques for intubation, neither of which require laryngoscopy, on haemodynamic responses associated with tracheal intubation in 88 normotensive

patients. this study conducted that the lightwand significantly attenuates hemodynamic changes following intubation in comparison with fiberoptic intubation.

Time taken for intubation and no. of attempts was significantly higher in group LWI as compared to group DLI.

Salvalaggio et al. evaluated the number of attempts, time taken for intubation, variation in blood pressure and heart rate, and postoperative sore throat, dysphagia, and hoarseness. They concluded that the in either group hemodynamic response did not affected by intubation techniques. However, number of attempts and time taken for intubation was more common in patients who were intubated with lighted stylet.

Complications like soft tissue injury, teeth injury, sore throat, and hoarseness of voice were significantly lesser in group LWI as compared to DLI.

Freedman et al compared the effects of lightwand with conventional laryngoscopy on the occurrence and severity of hypertension, tachycardia, postoperative sore throat, hoarseness, dysphagia in ambulatory surgical patients. They concluded that incidence of sore throat, hoarseness and dysphagia were significantly lower in patients who were intubated with lightwand as compared to direct laryngoscopy.

CONCLUSION

In the present study we saw that hemodynamic response to laryngoscopy and intubation in patients were less with lightwand device as compared to conventional laryngoscope.

Time taken and No. of attempts for intubation were more with lightwand technique as compared to conventional laryngoscope.

Complications like soft tissue injury, teeth injury, sore throat and hoarseness of voice was more in conventional laryngoscope compared to lightwand device.

Hence, we conclude that the lightwand is gentle, safe and effective intubating technique and is unaffected by the presence of blood and secretions in the upper airway. The incidence of hemodynamic responses, dental trauma, mucosal injuries, sore throat and hoarseness of voice are lesser as compared to the direct laryngoscopy as epiglottis is not lifted to visualize the glottis.

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