



## A Comparative Study of Propofol and Thiopentone with local Anaesthetic Spray as Inducing Agents for I-Gel Insertion

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### Abstract

**Aim:** *Of the study is to compare insertion conditions for I gel using propofol and thiopentone with lignocaine spray as inducing agents in terms of haemodynamic stability as well as in terms of no of insertion attempts, success of insertion, time taken for insertion, manipulations required, patient response to i- gel insertion, subjective ease of insertion and success of ventilation*

**Material and Methods:** *80 patients of age between 18-60 years with ASA grade I/II undergoing elective minor surgeries were divided into two groups. Group P (n=40) - received injection propofol 2.0mg/kg over 30 seconds. Group TL (n=40)- received 2 sprays of lignocaine 10% (10 mg/puff) to each side of oropharynx (total 40 mg) followed by injection thiopentone 5mg/kg over 30 seconds, ten minutes later.*

**Result:** *Results showed that propofol caused decrease in mean heart rate in group (P), while tachycardia had developed as compared to baseline in thiopentone group (TL). A slight decrease in blood pressure for short duration was seen in both groups but significantly more in propofol group, so propofol caused more cardiovascular depression than thiopentone. Both the groups were comparable in terms of no of insertion attempts, success of insertion, time taken for insertion, manipulations required, patient response to i- gel insertion, subjective ease of insertion and success of ventilation.*

**Conclusion:** *propofol gives ideal condition for I gel insertion with cardiovascular depression, while thiopentone with lignocaine spray provides the conditions for i-gel insertion equal to those of propofol, with more hemodynamic stability*

**Keywords:** *Propofol, Thiopentone sodium, Lignocaine spray, Igel,*

### Introduction

Airway control is central to spheres of the anaesthesiologist's work. Management of the airway is key to the successful induction of anaesthesia. It includes techniques for intubation

of the trachea along with whole range of airway manipulations that may be required during the course of anaesthesia. A number of supraglottic airway devices have been introduced in the clinical practice of the airway management, trying

to offer a simple and effective alternative to the endotracheal intubation. A certain degree of jaw relaxation and depth of anaesthesia is required to insert supraglottic airway devices in a non-paralysed patient.<sup>[1]</sup> Compared to tracheal intubation and extubation, the use of SADs is associated with more stability in hemodynamics<sup>[2]</sup> intracranial pressure<sup>[3]</sup> and intraocular pressure.<sup>[4]</sup> Most available data on the requirements of anaesthetic drugs and adjuncts used for induction of anaesthesia to allow easy insertion of supraglottic airway devices originate from research involving the laryngeal mask airway.<sup>[5]</sup> It has been shown that propofol rather than thiopentone provides superior conditions for the insertion of the laryngeal mask airway.<sup>[6]</sup> Whether this will be the same for i-gel is not known. Propofol is the agent of choice for intravenous induction, as it provides rapid induction with excellent jaw relaxation, but it has disadvantages such as pain at the injection site, involuntary limb movements, prolonged apnea and hypotension. Thiopentone has advantage of painless injection and less incidence of hypotension, although it does not provide good jaw relaxation and can cause coughing, gagging and laryngospasm. The insertion conditions with thiopentone can be made better by prior topical lignocaine spray to the posterior pharyngeal wall. The objective of this comparative analytical study is therefore to determine whether optimal conditions for i-gel insertion similar to propofol induction could be achieved by supplementation of topical lignocaine spray to thiopentone induction and compare insertion conditions for i-gel with propofol and thiopentone as induction agents.

### Aims and Objectives

- 1) Comparison of insertion conditions for I gel with propofol versus thiopentone with topical lignocaine spray in terms of haemodynamic stability
- 2) Comparison of insertion conditions for I gel with propofol versus thiopentone with topical lignocaine spray in terms of

- a) Number of insertion attempts
- b) Success/failure of insertion
- c) Time taken for i-gel insertion
- d) Manipulations required to aid insertion.
- e) Patient response to i-gel insertion
- f) Subjective ease of insertion
- g) Successful ventilation

### Materials and Methods

Following ethical committee approval Group of 80 patients of age between 18-60 years with ASA grading I/II undergoing elective minor surgeries divided into two groups.

Group P (n=40) - received injection propofol 2.0mg/kg over 30 seconds

Group TL (n=40)- received 2 sprays of lignocaine 10% (10 mg/puff) to each side of oropharynx (total 40 mg) followed by injection thiopentone 5mg/kg over 30 seconds, ten minutes later.

This comparative analytical study compares the ease of i-gel insertion following induction of anaesthesia with intravenous propofol, and thiopentone preceded by topical lignocaine spray (10%) 40mg.

### Inclusion Criteria

1. Age 18 to 60 years
2. ASA I & II
3. Who gave informed valid consent
4. Scheduled to undergo various elective minor surgical procedure

### Exclusion Criteria

1. Risk of gastric aspiration
2. Patients with restricted mouth opening
3. Patients undergoing oral surgeries
4. Cardiac, renal, hepatic, respiratory disease
5. grossly obese patients
6. ASA grade III and IV patients.
7. Patients with altered sensorium /unconscious/disoriented/Mentally retarded.
8. Patients with Neck mass or deformity.

All the patients were interviewed for detailed clinical history and examined. They were then subjected to routine blood, urine and other

required investigations. Each patient was given all information and details about the procedure and drugs used. They were free to clarify doubts they had. Written informed consent in English and Marathi was taken from all patients.

After arrival in operation theatre, iv line secured and monitors attached i.e. ECG monitor, Pulse oxymeter and capnograph. BP cuff tied.

Basal values of Heart rate, BP, and SpO<sub>2</sub> were noted. Premedication was given with,

Inj glycopyrrolate 5 mcg/kg im half an hour prior to surgery.

Inj. ondansetron 0.08 mg/kg

Inj midazolam 0.03 mg/kg

Inj pentazocine 0.3 mg/kg

Group P (n=40) - received injection propofol 2.0mg/kg over 30 seconds.

Group TL (n=40)- received 2 sprays of lignocaine 10% (10 mg/puff) to each side of oropharynx (total 40 mg) followed by injection thiopentone 5mg/kg over 30 seconds, ten minutes later.

The device was inserted and secured with adhesive tape by the anaesthesiologist who were blinded to the induction agent employed and application of topical lignocaine spray to the posterior pharyngeal wall, ventilation of patient was manually assisted until the spontaneous breathing resumed. Anaesthesia was maintained with oxygen, nitrous oxide and isoflurane, and monitoring done for heart rate, BP, SpO<sub>2</sub>, ECG and observations made for

1. Number of insertion attempts as I or II
2. Success/failure of insertion
3. Time taken for i-gel insertion was noted i.e from picking up the device to successful ventilation
4. Manipulations required to aid insertion.
5. Patient response to i-gel insertion was be noted as

a. excellent (E): when there was no gagging, coughing and laryngospasm

b. good (G): coughing, gagging or laryngospasm for less than 30 seconds.

6. Successful ventilation present or not.

7. Subjective ease of insertion

a. very easy (VE)

b. easy (E)

The data was managed in Microsoft excel spreadsheet. Parameters were described with average, standard deviation, minimum and maximum observation. Demographics and General information like count, average and percentage for various parameters with all permutations and combinations were calculated in Microsoft excels. Unpaired T Test and chi square test was used to compare the results of various parameters. A p value <0.05 was considered statistically significant. All statistical analysis was done using Minitab 16 software.

### Result

**Table 1:** Comparison of age and weight of patients between two groups (P value is significant if p<0.05 and highly significant if p<0.01)

	Age (years) Mean ± SD	Weight (kgs) Mean ± SD
P (n= 40)	40.23 ± 11.34	59.05 ± 8.05
TL (n= 40)	40.90 ±10.98	59.95 ±8.18
t value	t = 0.27	t = 0.49
p value	p =0.78	p =0.62
Inference	NS	NS

**Table 2:** Gender wise distribution of patients in group P and group TL

Group	Male	Female
P(n=40)	20	20
TL(n=40)	20	20

**Table 3:** ASA grading of patients in group P and group TL

		GroupP (n=40)	Group TL(n=40)
ASA GRADING	I	30	30
	II	10	10
	TOTAL	40	40

**Table 4:** Comparison of Heart rate in group P and group TL

	HEART RATE				t value	P value
	Group P (n =40)		Group TL (n= 40)			
	Mean	SD	Mean	SD		
Preoperative	75.00	4.07	75.00	4.27	0.00	1.00
1 minute	71.95	3.02	78.85	3.67	9.17	<0.0001
5 minute	75.70	2.70	75.05	4.15	0.83	0.40

**Table 5:** Comparison of mean arterial blood pressure in group P and group TL

	Mean arterial blood pressure (MAP)				t value	P value
	Group P (n =40)		Group TL (n= 40)			
	Mean	SD	Mean	SD		
Preoperative	93.42	4.57	93.1	5.62	0.28	0.77
1 minute	81.2	4.46	89.77	4.89	8.19	<0.0001
5 minute	93.33	3.92	92.93	4.46	0.42	0.67

**Table 6:** Comparison of no. of insertion attempts in group P and group TL

			Group P	Group TL	P value
			(n=40)	(n=40)	
No of insertion attempts	1	% Count	38 (95%)	36 (90%)	0.39
	2	%Count	2 (5%)	4 (10%)	
Total		% Count	40 (100%)	40 (100%)	

**Table no 7:** Comparison of success of i-gel insertion in group P and group TL

			Group P (n=40)	Group TL(n=40)
SUCCESS OF INSERTION	YES	% COUNT	40 (100%)	40 (100%)
	NO	% COUNT	0	0

**Table 8:** Comparison of mean insertion time in group P and group TL

	Mean Time (sec)	SD	Minimum (sec)	Maximum (sec)
Group P (n= 40)	9.975	1.12	8	12
Group TL (n=40)	10.08	1.18	8	12
t value	t = 0.38			
p value	p =0.69			

**Table 9:** Comparison of manipulations required in group P and group TL

			Group P	Group TL	P value
			(n=40)	(n=40)	
MANIPULATIONS REQUIRED	YES	% COUNT	2 (5%)	4 (10%)	0.39
	NO	% COUNT	38 (95%)	36 (90%)	
	TOTAL	% COUNT	40 (100%)	40 (100%)	

**Table 10:** Comparison of patient response to i-gel insertion, in group P and group TL

	GRADING		Group (n=40)	Group TL(n=40)	P value
PATIENT RESPONSE	EXCELLENT	% COUNT	35 (87.5%)	32 (80%)	0.36
	GOOD	% COUNT	5 (12.5%)	8 (20%)	
		% COUNT	40 (100%)	40 (100%)	

**Table 11:** Comparison of ease of insertion of i-gel in group P and group TL

			Group P(n=40)	Group TL(n=40)	P value
GRADING	VERY EASY(VE)	% COUNT	34 (85%)	32 (80%)	0.55
	EASY (E)	% COUNT	6 (15%)	8 (20%)	
TOTAL		% COUNT	40 (100%)	40 (100%)	

### Discussion

The present comparative study was conducted to compare two drugs propofol and thiopentone with lignocaine spray for insertion of i-gel in terms of haemodynamic stability along with number of insertion attempts, success of insertion, time taken for insertion, manipulations required, patients response to i-gel insertion, successful ventilation and subjective ease of insertion. The results were then compared and contrasted with other studies done in similar line.

Both the groups were comparable in terms of age & weight (table1), sex (table2), ASA grading (table3) and SpO<sub>2</sub>.

Results showed that propofol caused decrease in mean heart rate in group (P), while tachycardia had developed as compared to baseline in thiopentone group (TL).<sup>[7]</sup>

Baseline heart rate was similar in two groups. (table 4)

After 1 minute of i-gel insertion group P had fall in mean heart rate but there was a significant increase in the mean heart rate in group TL from the baseline values.

After 5 minutes post i-gel insertion, heart rate in the two groups reached near baseline.

S Ramaswamy et al<sup>[8]</sup> conducted a study to compare the insertion conditions for i-gel, using propofol, thiopentone and thiopentone with

topical lignocaine spray. In this study they found that after 1 minute of i-gel insertion group P had fall in mean heart rate with increase in the mean heart rate in group T and TL from the baseline values. After 5 minutes post i-gel insertion the heart rate in all the three groups reached near baseline.

Results of our study were similar to above study.

Baseline mean arterial pressure (MAP) was similar in two groups. (table5)

Whereas the recording after 1 min post i-gel insertion showed a very high statistically significant difference between the two groups when compared to baseline ( $p < 0.01$ ). The MAP was significantly lower in group P than that of group TL when compared to baseline.

The fall in MAP at 5 min post i-gel insertion was similar in the two groups.

A slight decrease in blood pressure for short duration was seen in both groups but significantly more in propofol group.<sup>[9]</sup>

Our results suggested that propofol caused more cardiovascular depression than thiopentone.

C.R.Seavell et al<sup>[10]</sup> conducted a study and assessed conditions for insertion of a laryngeal mask airway in 90 patients, who received either thiopentone 5 mg.kg<sup>-1</sup> preceded by 40 mg of topical lignocaine spray to the posterior pharyngeal wall or propofol 2.5 mg.kg<sup>-1</sup> alone,

and concluded that thiopentone preceded by topical lignocaine spray provides conditions for insertion of a laryngeal mask equal to those of propofol, with more hemodynamic stability.

Kumar R et al in 2012 <sup>[11]</sup> conducted a comparative study between propofol and thiopentone with lignocaine spray for laryngeal mask airway insertion, and concluded that thiopentone preceded by lignocaine spray provided equal condition as of propofol for insertion of LMA with more hemodynamic stability.

Results of our study were similar to above study.

While considering both the groups first attempt of insertion was 95% in group P while that of 90% in group TL(table 6).Though statistically not significant (p value 0.3) success rate of first attempt insertion of i-gel was better in group P.

I-gel was successfully inserted in either one or two attempts in both the groups without failure of insertion (table7).

Time taken for insertion of i-gel was noted i.e. from picking up the device to successful ventilation, in both the groups. Though statistically not significant, time taken for i-gel insertion was less in group P than that of group TL(table 8).

S Ramaswamy et al<sup>[8]</sup> conducted a study to compare the insertion conditions for i-gel, using propofol, thiopentone and thiopentone with topical lignocaine spray. Result of this study and our study in terms of attempt of insertion, success of insertion and time taken for insertion is similar.

In group P, in 95% of patients i-gel was inserted without manipulations while in group TL no manipulations required in 90% patients. with p value 0.3 which was insignificant statistically. 5% of patients in group P and 10% of patients in group TL required either manipulations in terms of Jaw thrust, Chin lift, changing the size of device or increasing depth of anaesthesia (table 9). 87.5% patients in group P while 80% patients in group TL showed excellent response to i-gel insertion, and there were no incidence of gagging, coughing or laryngospasm with p value of 0.3 which was insignificant statistically. While 12.5%

patients in group P and 20% patients in group TL showed good response in which gagging was lasted less than 30 seconds.(Table 10).

Patient response to i-gel insertion depending on the incidence of gagging, coughing, laryngospasm was better in group P than group TL and statistically insignificant. Propofol is superior to thiopentone alone as an induction agent for insertion of i-gel because it is more effective in suppressing upper airway reflexes.<sup>[7][8][10]</sup>

T.M.Cook et al <sup>[12]</sup> conducted a study in which conditions for insertion of a laryngeal mask airway in 90 unpremedicated adult patients were assessed in a randomized, single-blinded trial, The group receiving topical lignocaine had a lower incidence of laryngospasm (p < 0.05), required fewer attempts for successful insertion of the laryngeal mask (p < 0.05) and coughed or gagged less frequently than group receiving lignocaine intravenously (p > 0.05). Overall, the conditions for laryngeal mask airway insertion were better in the topical group (p < 0.05). Topical lignocaine spray prior to thiopentone provides conditions for insertion of a laryngeal mask that were superior to those provided by lignocaine and thiopentone intravenously and also thiopentone preceded by topical lignocaine spray reduces the incidence of laryngospasm, coughing and gagging. This finding was because thiopentone didn't suppress the upper airway reflexes.

G., Bhandari, R.K., Singh <sup>[13]</sup> conducted a study to assess the efficacy of topical vs. intravenous lidocaine prior to intravenous thiopentone in providing good conditions for LMA insertion, and concluded that the conditions for LMA insertion were significantly better in topical lidocaine group with decreased incidence of gagging and coughing.

Results of these studies and our study were similar.

I gel insertion was very easy in 85% of patients in group P while in group TL it was 80% ,with p value 0.5 which was insignificant statistically. (Table 11)

Patients in both the groups were successfully ventilated with visible chest movements, Square wave capnograph trace, Oxygen saturation above 95% and Absence of stridor.

Study results of S Ramaswamy et al<sup>[8]</sup> and our study in terms of attempt of insertion, success of insertion and time taken for insertion are similar.

Our results suggest that propofol caused more cardiovascular depression than thiopentone<sup>[14]</sup>. Although propofol caused decrease in MAP, it maintained heart rate due to blunting baroreceptor reflexes thereby preventing compensatory tachycardia<sup>[15]</sup>. This effect is beneficial where tachycardia is undesirable. Also Propofol induction provides ideal conditions for insertion of i-gel as the upper airway reflexes were suppressed to a greater extent than thiopentone, allowing smooth insertion in short time<sup>[16]</sup>. Application of topical lignocaine spray to the posterior pharyngeal wall prior to thiopentone induction provides the conditions for i-gel insertion equal to those of propofol, with more hemodynamic stability.

### Conclusion

The following inferences were drawn from the study:

- Propofol caused more cardiovascular depression than thiopentone.

- Propofol induction provides ideal conditions for insertion of i-gel.

- Application of topical lignocaine spray to the posterior oropharynx prior to thiopentone induction provides the conditions for i-gel insertion equal to those of propofol, with more hemodynamic stability.

Our study concluded that,

- 1) Propofol provides near ideal conditions for i-gel insertion causing cardiovascular depression but alternative to propofol, thiopentone with topical lignocaine spray also provide optimal conditions for insertion of i-gel with more hemodynamic stability.

- 2) When propofol versus thiopentone with topical lignocaine spray were compared as inducing agents for insertion of i-gel, results were comparable in terms of no of insertion attempts, successful insertion, time taken for insertion, manipulations required, patients response, successful ventilation and ease of insertion.

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