Intubating Conditions Comparison, After Administration of Propofol with Muscle Relaxant and Profofol without Muscle Relaxant-An Observational Study

Parag Sabale[1], Pratibha Deshmukh[2], Swapnil Meshram[3], Nandkishor Bankar[4], Ashok Choudhary[5]

[1]Assistant Professor Dept. of Anesthesiology Datta Meghe Medical College, Shalinitai Meghe Hospital and Research Centre, (DMIMS), Nagpur-441110, [2]Professor and HOD Dept. of Anesthesiology Datta Meghe Medical College, Shalinitai Meghe Hospital and Research Centre, (DMIMS), Nagpur-441110, [3]Assistant Professor Dept. of Anesthesiology Datta Meghe Medical College, Shalinitai Meghe Hospital and Research Centre, (DMIMS), Nagpur-441110, [4]Assistant Professor, Dept. of Microbiology Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences, Sawangi (Meghe) Wardha-442001, [5]Professor, Dept. of Anesthesiology Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences, Sawangi (Meghe) Wardha-442001

Abstract

Introduction: General anaesthesia is a condition where generally neuromuscular blocking agents in the form depolarizing or non-depolarizing agents are used for intubation of trachea. A quest for a safer and suitable intravenous induction agent has led to the development of Propofol, a 2, 6, di-isopropyl phenol after a series of investigations. Propofol also reduces hypertension and tachycardia which occurs response during intubation. Thus this technique protect against the potential adverse effects of tracheal intubation like intra-cranial, intraocular hypertension and tachycardia.

Material and Method: 100 adult patients of American Society of Anaesthesia (ASA) grade I & II of both the sexes belonging to the age group of 18-55 years, from various surgical specialties and undergoing surgery under general anaesthesia were divided in to two groups of 50 each. In both the group intubation was graded and scored according to ease of laryngoscopy, position of vocal cord, coughing, jaw relaxation and movement of limb. Score of 5 was classified as excellent, 6-10 good, 11-15 poor and 16-20 as bad. Total score of <=10 was considered as acceptable and score of >=10 as unacceptable.

Results: Youngest patient was of 18 years in group I and 20 years in group II. Eldest patient was of 54 years in group I and 55 years in group II. Maximum number of patients were in 20-30 years of age 31 (62%) in group I and 23 (46%) in group II. Excellent intubating conditions were seen in 32 (64%) patients of group I and 49 (98%) patients of group II**.** Before induction baseline readings of mean arterial pressure, systolic blood pressure (SBP), diastolic blood pressure (DBP), and pulse rate were noted in both the groups values. Similarly reading above parameters were just after induction, after intubation, one minute after intubation, two minute after intubation and 5 min after intubation. In both the groups slight decrease in all the parameter were noted just after induction. In both the groups slight decrease in all parameters were noted just after induction .However slight increase in value of all the parameter were noted after intubation. Difference which was noted was not statistically significant. Also after 5 minute of intubation parameter in both groups were approximately similar that of baseline ($p>0.05$).

Conclusion: 2.5 mg/kg body weight of Propofol with adequate doses of opioids and inhalational agent can produce acceptable intubating condition when compared with Propofol 2.5mg/kg along with succinylcholine.

Keywords: *Intubation without the use of muscle relaxants, Propofol-Sevoflurane induction.*

Corresponding Author:
Dr. Pratibha Deshmukh
Professor and HOD Dept. of Anesthesiology, Datta Meghe Medical College, Shalinitai Meghe Hospital and Research Centre, (DMIMS), Nagpur-441110

Introduction

After induction of general anesthesia, neuromuscular relaxants provide the best conditions for laryngoscopy and tracheal intubation. Due of the fast onset and

short duration of succinylcholine is widely used as an effective muscle relaxant. However, it is proposed that succinylcholine should not be used regularly due to the risk of certain complications, such as rhabdomyolysis and hyperkalemia, as well as the risk of masseter spasm and malignant hyperthermia.[75] James and Glen presented a description of the discovery of this and other alkyl-phenol anesthetic activity in 1977.[76] Clear headed, rapid and symptoms free recovery was observed in Propofol particularly in day case surgeries[77]. Propofol's most common side effect is peripheral vasodilation which results in hypotension. The primary cause of peripheral vasodilation is a reduction in the sympathetic outflow from the central nervous system[78]. Recent studies have shown that tracheal intubation with hypnotics and short-acting opioids such as alfentanil or remifentanil can be performed effectively in a patient with normal anatomy of the airway without the need for muscle relaxants[79,80]. Studies have also shown that Propofol offers better condition for tracheal intubation as opposed to thiopental or etomidate[81]. Nondepolarizing neuromuscular blocking agents are an option, but they are slow acting, have a prolonged neuromuscular blockade, and paralysis cannot be reversed easily if mask ventilation or tracheal intubation fails to control the airways[82,83,84]. Muscle relaxants are given traditionally to facilitate the tracheal intubation. of all the available muscle relaxants, succinylcholine, with a rapid (approximately equal to 1 min) onset and a fast recovery is still the most commonly used muscle relaxant for rapid-sequence induction despite its side effects[85]. In this study we compared the intubating conditions and intubation response with muscle relaxant, and without muscle relaxant.[86]

Material and Method

Present study was conducted in the department of Anaesthesiology at Datta Meghe Medical College and Shalinitai Meghe Hospital and Research Centre Nagpur, in collaboration with Jawaharlal Nehru Medical College Datta Meghe Institute of Medical Sciences, Sawangi Meghe, Wardha. 100 patients were randomly divided into two groups of 50 patients each. In the preanaesthesia room, an intravenous (IV) cannula of 20G was inserted and patient were shifted into the operating theatre and preinduction monitoring of NIBP, SPO2 and pulse rate was done. In both the groups patients oropharynx was sprayed with 10% lignocaine spray 3 times before induction of anaesthesia, premedication in the form of injection midazolam 1mg IV, injection fentanyl 2µgm/kg was used.

In Group I: Induction of anaesthesia was done with injection Propofol 2.5 mg/kg slowly over 20 seconds and Sevoflurane with MAC 1.2 with 100% oxygen, laryngoscopy and intubation was attempted 150sec after induction.

In Group II: Induction of anaesthesia was done with injection Propofol 2.5 mg/kg slowly over 20 seconds. After loss of eye lash reflex, ventilation was checked and then injection succinylcholine 2mg/kg body weight was injected, laryngoscopy and intubation was done after 60 second.

All cases included were monitored throughout the procedure with E.C.G. using cardiac monitor on lead II, PaO_2 with Pulse Oxymeter. Blood pressure and pulse were recorded. In both the groups laryngoscopy and intubation was performed by an experienced anaesthesiologist having at least 3 years of experience using Macintosh blade and appropriate size oral endotracheal tube. During laryngoscopy and intubation every patient was assessed for variable like ease of laryngoscopy, position of vocal cord, coughing, jaw relaxation and movement of limb and scoring was done as mentioned in table no 3.

Statistical analysis was done. All the observation were recorded and tabulated in MS Excel Windows Version 2013. Results were analyzed statistically by X^2 test and 'P' value was less than 0.05 the difference of the two sets of observation was considered significant and P>0.05 as not significant.

Results

Youngest patient was of 18 years in group I and 20 years in group II. Eldest patient was of 54 years in group I and 55 years in group II. Maximum number of patients were in 20-30 years of age 31 (62%) in group I and 23 (46%) in group II. Intubating condition are classified as mentioned in table**.**

Table 1: Steyn's modification of Helbo-Hansen intubation scoring system (Score of 5 was classified as excellent, 6-10 good, 11-15 poor and 16-20 as bad. Total score of <=10 was considered as acceptable and score of >=10 as unacceptable.)

Variable	Acceptable		Unacceptable	
	Excellent	Good	Poor	Bad
	1	2	3	4
Jaw relaxation	Relaxed	Not fully	Stiff	Rigid
Vocal cord position	Open	Moving	Closing	Closed
Laryngoscopy	Easy	Fair	Difficult	Impossible
Coughing	None	Slight	Moderate	Severe
Limb movement	None	Slight	Moderate	Vigorous

Excellent intubating conditions were seen in 32 (64%) patients of group I and 49 (98%) patients of group II.

Table 2: Overall intubating conditions

S.No.	Intubating conditions	Group I		Group II		Group I Vs Group II		Significance
		No.	%	No.	%	X^2	P-value	
1	Excellent	32	64	49	98	18.591	< 0.0001	S
2	Good	17	34	1	2	17.171	< 0.0001	S
3	Poor	01	02	00	00	_	_	NS

S: Significant, NS: Not significant.

Statistically significant difference was observed in group I & group II**.** Intubating conditions were excellent in 32 (64%) patients of group I and 49 (98%) patient of group II, although less in group I but they were acceptable for intubation. Good intubating conditions were found in 17(34%) and 1(2%) in patients of group 1 and group 2 respectively which is also statistically significant.

From above finding although, intubating condition were excellent in 98% in group II compared to 64% in group I, good intubating condition were found in 34% in group I and 2% in group II. Poor intubating condition was found in only 1 patient of group I. However, there was no failed intubation noted in our study.

Table 3: Mean arterial pressure change as compared to baseline

Sr. No.	Mean arterial pressure	Group I		Group II		T-value	p-value	
		Mean	SD	Mean	SD			
1	Before Induction	93.25	7.68	94.78	9.52	0.884	0.3786	NS
2	After Induction	83.26	6.78	82.58	6.89	0.497	0.6200	NS
3	After relaxant	-	-	80	6.07	-	-	
4	Just after intubation	94.20	7.17	94.48	7.26	0.194	0.8465	NS
5	One min. after intubation	87.40	5.42	84.83	6.89	-2.073	0.040	S
6	Two min. after Intubation	88.54	5.48	85.87	6.73	-2.175	0.032	S
7	Five min. after intubation	92.48	4.79	91.55	5.98	-0.858	0.3928	NS

Before induction mean arterial pressure (MAP) (baseline) was 93.25±7.68 and 94.78±9.52 in group I and group II respectively (p=0.3786, T value=0.884). There was slight decrease in mean arterial pressure initially after induction with mean 83.26 ±6.78 and 82.58±6.89 in group I and group II respectively which was statistically not significant (0.6200). There was slight increase in mean arterial pressure just after intubation with mean 94.20±7.17 and 94.48±7.26 in group I and group II respectively .These result were also statistically not significant (P=0.8465) when compared in both group.

One min. after intubation in group I and II responses were 87.40±5.42 and 84.83±6.89 respectively (p=0.040). Two min. after Intubation in group I and II responses were 88.54±5.48 and 85.87±6.73 respectively. Both these value were statistically significant (p=0.032). After 5min result of MAP wer92.48 ±4.79 and 91.55±5.98 in group I and II which is also statistically not significant (p=0.3928), also these value are nearer to baseline value as before induction.

Table 4: Systolic Blood Pressure (SBP) change as compared to baseline

Sr.No.	Systolic Blood Pressure (SBP)	Group I		Group II		T-value	p-value	
		Mean	SD	Mean	SD			
1	Before Induction	126.30	12.68	128.78	11.24	1.03	0.11	NS
2	After Induction	121.45	9.56	119.08	9.56	1.13	0.25	NS
3	After relaxant	-	-	120.89	9.77	-	-	
4	Just after intubation	131.09	12.87	130.09	13.07	-0.385	0.70	NS
5	One min. after intubation	120.96	6.78	117.08	8.08	-2.601	0.01	S
6	Two min. after Intubation	114.09	6.98	110.76	7.97	-2.223	0.02	S
7	Five min. after intubation	124.43	8.96	127.98	9.76	1.8	0.06	NS

Similarly Table 4 indicates before induction SBP (base line) value as 126.30±12.68 and 128.78±11.24 in group I and II. There was slight decrease in SBP just after induction with mean 121.45±9.56 and 119.08±9.56 in group I and II respectively (p=0.25 whisch is statistically not significant). However, there was slight increase in SBP just after intubation with mean 131.09±12.87 and 130.09±13.07 in group I and group II respectively (p=0.70). These results were not statistically significant (P=0.70). After One minute and two minute slight decrease SBP was observed P value of which were 0.01 and 0.02 respectively which were statistically significant. After 5min result of SBP were 124.43 ±8.96 and 127.98±9.76 in group I and II which were statistically not significant (P=0.06), also these value are nearer to baseline value as before induction.

Table 5: Diastolic Blood Pressure (DBP) change as compared to baseline

Sr.No.	Diastolic Blood Pressure (DBP)	Group I		Group II		T-value	p-value	
		Mean	SD	Mean	SD			
1	Before Induction	85.45	6.54	86.54	4.85	0.94	0.34	NS
2	After Induction	83.14	5.77	82.13	5.98	0.85	0.39	NS
3	After relaxant			83.01	6.97	-	-	
4	Just after intubation	89.08	5.98	88.86	5.05	-1.97	0.84	NS
5	One min. after intubation	84.65	6.80	81.98	5.65	-2.1	0.0352	S
6	Two min. after Intubation	84.76	6.96	82.01	5.25	-2.079	0.0403	S
7	Five min. after intubation	84.89	3.34	85.85	4.14	1.2	0.2049	NS

Table 5 indicates before induction value of DBP (base line) value as 85.45±6.54 and 86.54±4.85 in group I and II respectively (p=0.34, T value=0.94). There was slight decrease in DBP just after induction with mean 82.13±5.98 and 83.14±5.77 in group I and II respectfully. . However, there was slight increase in DBP just after intubation with mean 88.86±5.05 and 89.08±5.98 in group I and group II respectively. These results were also not statistically significant (P=0.84). After One minute and two minute slight decrease in DBP was observed. After 5min result of DBP were 84.49 ±3.34 and 86.65.98±5.34 in group I and II which is also statistically not significant (P=0.01), also these value are nearer to baseline value as before induction.

Discussion

Anaesthesia induction with short-acting hypnotic medications is facilitated by the simultaneous administration of a depolarizing muscle relaxant such as succinylcholine for endotracheal intubation. Even non-depolarizing muscle relaxants may be associated with undesirable side effects such as prolonged neuromuscular blockage, the need to reverse neuromuscular blockage, or the inability to reverse paralysis rapidly if necessary, especially in context with difficult airway. For these purposes, many researchers have found a method of providing good intubating conditions rapidly without the use of muscle relaxants[87].

In a study by McNeil IA[88] it was observed that patients who were intubated after remifentanil had dose-dependent intubating conditions, similar to those developed with succinylcholine at 4 micrograms/kg. Post-induction mean arterial pressure in remifentanil 2 micrograms/kg, remifentanil 4 micrograms/kg and succinylcholine 1 mg/kg group has been observed to be decreased from baseline values by 21 percent, 28 percent and 8 percent (P > 0.05).Similar results were observed in the present study like, there was slight decrease in mean arterial pressure initially after induction with mean 83.26 ±6.78 and 82.58±6.89 in group I and group II respectively.

The pre induction mean arterial pressure (MAP) (baseline) was 93.25±7.68 and 94.78±9.52 in group I and group II respectively (p=0.3786, T value=0.884). One min. after intubation in group I and II responses were 87.40±5.42 and 84.83±6.89 respectively. Two min. after Intubation in group I and II responses were 88.54±5.48 and 85.87±6.73 respectively. These were statistically significant (p=0.040, p=0.032). However, after 5min result of MAP were 92.48±4.79 and 91.55±5.98 in group I and II which is also statistically not significant, also these values were nearer to baseline value as before induction.

Before induction SBP (base line) values were 126.30±12.68 and 128.78±11.24 in group I and II. There was slight decrease in SBP just after induction with mean 121.45±9.56 and 119.08±9.56 in group I and II respectively (p=0.25 not significant). However, there was slight increase in SBP just after intubation with mean of 131.09±12.87 and 130.09±13.07 in group I and group II respectively. These results were not statistically significant (P=0.70). After One minute and two minute slight decrease SBP was observed p value of which were 0.01 and 0.02 respectively. After 5min result of SBP were 124.43±8.96 and and127.98±9.76 in group I and II respectively which is also statistically not significant (P=0.06), also these value are nearer to baseline value as before induction.

Similarly before induction value of DBP (base line) value were 85.45±6.54 and 86.54±4.85 in group I and II respectively (p=0.34, T value=0.94). There was slight decrease in DBP just after induction with mean 83.14±5.77 and 82.13±5.98 in group I and II respectively (p=0.39). However, there was slight increase in DBP just after intubation with mean 89.08±5.98 and 88.86±5.05 in group I and group II respectively. These results were also not statistically significant (P=0.84). After One minute and two minute slight decrease in DBP was observed p value of which were 0.0352 and 0.0401 which were statistically significant when compared in either group. After 5min result of DBP were 84.49 ±3.34 and 85.85±4.14 in group I and II which is also statistically not significant (P=0.2049), also these value are nearer to baseline value as before induction.

Conclusion

From above study we can conclude that, our technique of using Propofol with inhalational agent for intubation proves to be promising in difficult airway situations and in cases where use muscle relaxant of both classes are contraindicated for intubation of trachea e.g. neuromuscular disorder like myasthenia gravis. Use Propofol plus opioids and lignocaine spray without the use of muscle relaxant to achieve similar intubating conditions without much change in hemodynamics.

Limitation of our study is present trial was designed for elective cases and emergency cases were excluded, ASAIII, ASAII, MMTIII, MMTIV were excluded from our study. This study in future can be applied for patients where use muscle relaxant of both classes are contraindicated for intubation of trachea such as neuromuscular disorder like myasthenia gravis.

Ethical Clearance: Taken from institutional ethics committee.

Source of Funding: Self.

Conflict of Interest: Nil.

Reference

1. Coté CJ. Pediatric anesthesia. In: Miller R, editor. Miller's Anesthesia. 7th ed. Philadelphia: Churchill Livingstone Co; 2010. pp. 2559–97.
2. James R, Glen JB. Synthesis, biological evaluation, and preliminary structure-activity considerations of a series of alkylphenols as intravenous anesthetic agents. J Med Chem. 1980 Dec;23(12):1350-7.
3. Gerald Edelist, A comparison of propofol and thiopentone as induction agents in outpatient surgery, Canadian J. of Anaesthesia, 34:2, Pg. 110-6, 1987.
4. Bhandari R. Propofol for endoscopy in Canada: a sleepy or a slippery slope? Dr. Rakesh Bhandari is interviewed by Paul C Adams. Can J Gastroenterol. 2006;20(12):765–766. doi:10.1155/2006/214105
5. Jabbour-Khoury SI et al. A combination of alfentanil-lidocaine-propofol provides better intubating conditions than fentanyl-lidocaine-propofol in the absence of muscle relaxants.Can J Anaesth. 2003 Feb; 50(2):116-20.
6. Klemola U et al. Tracheal intubation without the use of muscle relaxants: remifentanil or alfentanil in combination with propofol.ActaAnaesthesiol Scand. 2000 Apr; 44(4):465-9.
7. Erhan E et al. Propofol - not thiopental or etomidate - with remifentanil provides adequate intubating conditions in the absence of neuromuscular blockade.Can J Anaesth. 2003 Feb; 50(2):108-15.
8. Rajan S et al. Evaluation of endotracheal intubating conditions without the use of muscle relaxants following induction with propofol and sevoflurane in pediatric cleft lip and palate surgeries.J AnaesthesiolClinPharmacol. 2014 Jul; 30(3):360-5.
9. Gupta A et al. Comparative evaluation of different doses of propofol preceded by fentanyl on intubating conditions and pressor response during tracheal intubation without muscle relaxants. PaediatrAnaesth. 2006 Apr; 16(4):399-405.
10. Tendulkar, M et al. "Prospective Comparison of Pressor and Airway Responses to IV Esmolol and IV Dexmedetomidine during Emergence from General Anaesthesia and Extubation." Journal of Krishna Institute of Medical Sciences University 6, no. 1 (2017): 49–56.
11. Sparr HJ. Choice of the muscle relaxant for rapid-sequence induction. Eur J Anaesthesiol Suppl. 2001;23:71-6.
12. Bhalerao, N et al. "Comparison between Magnesium Sulfate (50 Mg/Kg) and Lignocaine (2 Mg/Kg) for Attenuation of Intubation Response in Hypertensive Patients." Journal of Datta Meghe Institute of Medical Sciences University 12, no. 2 (2017): 118–20. https://doi.org/10.4103/jdmimsu.jdmimsu_58_17.
13. Shaikh SI, Bellagali VP. Tracheal intubation without neuromuscular block in children. Indian J Anaesth. 2010;54(1):29–34.
14. I.A. Mc Neil, B. Culbest and I. Russel, Comparison of intubating conditions following propofol and succinylcholine with propofol and remifentanil 2μg kg^{-1} or 4μg kg^{-1}, Br. J. of Anaesthesia 2000, 85 (4): 623-5