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A Study of Hemodynamics as a Result of Combining Propofol with Dexmedetomidine During Induction of Anaesthesia

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Abstract: ***Dexmedetomidine a potent, highly selective α2 adrenoreceptor agonist possess desirable properties like sedation, analgesia, sympatholysis and reduces the anaesthetic requirement. Bradycardia and hypotension are the most common side effects of dexmedetomidine. Propofol, currently the most popular induction agent due to its beneficial effects such as suppression of airway reflexes, fast recovery etc has the same side effects during induction of anaesthesia. Hence titration of the above mentioned drugs can minimize the adverse and retain the desired effects of their pairing.***

Keywords: Hemodynamic, Propofol, Dexmedetomidine, Anesthesia, Combination

1. Introduction

Propofol, barbiturates, and benzodiazepines are all associated with profound hemodynamic adverse effects at doses needed to attenuate response to laryngoscope and intubation [20] .As it is impractical to achievesufficient depth to prevent sympathetic response to intubation solely with a single agent, adjuvants like opioids, β blockers, calcium channel blockers,vasodilators, etc areused[21]. It is essential to remember that, time of laryngoscope and intubation should coincide with the peak affect of agents used to minimize the hemodynamic stimulation.Opioids are widely used adjuvants and appear to give a graded response in blunting hemodynamic responses. While 2 µg/kg of fentanyl given before induction partially attenuates cardiovascular response, higher doses that prevent a hemodynamic response to intubation are associated with the risk of adverse effects[22].

A bolus of 1.5 mg/kg of lignocaine given intravenously adds 0.3 MAC of anesthetic potency and can blunt hemodynamic responses to intubation[23]. Kasten and co – workers showed that lignocaine administered (3 mg/kg) intravenously is associated with significant attenuation of hemodynamic response to endotracheal intubation[24].

This study puts in a sincere effort to study the hemodynamic effects of mixing the propofol with dexmedetomidine during induction of anaesthesia.

2. Aims and Objectives

To study the hemodynamic effects of mixing the propofol with dexmedetomidine during induction of anaesthesia.

3. Materials and Methods

This study was conducted on 400 patients posted for elective surgeryunder general anaesthesia in Kanachur Institute of Medical Sciences, Deralakatte,Mangalore. The study was conducted from 1/10/2015 to 1/06/2016.

Patients were randomly allocated to one of the four study groups i.e. group A,B,C,D by computer generated sequence to receive a study drug diluted to 20 ml via an infusion pump over 20 minutes.

- Group A received 1 µg/kg of dexmedetomidine.
- Group B received 0.6 µg/kg of dexmedetomidine.
- Group C received 0.3 µg/kg of dexmedetomidine.
- Group D received 20 ml of normal saline.

The parameters of the study such as heart rate, BP (systolic and diastolic),was recorded by a person who was unaware of the nature of the study.

4. Results

Table 1: Systolic BP

Time	*Group*	*Mean (mmHg)*	*Std. Dev*	*Mean square*	*F*	*p value*
1	A	125.18	15.369	373.013	1.978	0.117
	B	124.83	12.971			
	C	124.68	13.531			
	D	128.89	12.969			
2	A	118.8	18.14	1258.351	5.125	0.002
	B	116.43	13.584			
	C	119.71	15.822			
	D	125.12	14.891			
3	A	115.21	18.734	1806.04	7.451	<0.001
	B	112.56	13.465			
	C	118.08	14.901			
	D	122.84	14.812			
4	A	103.88	16.387	632.772	3.005	0.03
	B	101	13.175			
	C	107.27	14.48			
	D	104.77	13.886			
5	A	102.46	16.718	574.643	2.857	0.037
	B	98.73	12.743			
	C	104.56	14.129			
	D	102.9	12.866			
6	A	114.75	20.337	4908.865	12	<0.001

	B	116.71	19.738			
	C	123.95	20.406			
	D	130.72	20.424			
7	A	109.24	18.447	4138.147	12.25	<0.001
	B	107.82	18.512			
	C	115.71	17.558			
	D	122.37	18.966			
8	A	98.51	13.509	5721.571	23.04	<0.001
	B	98.77	15.774			
	C	105.09	15.592			
	D	115.29	17.834			
9	A	97.53	11.486	4126.085	18.23	<0.001
	B	98.53	16.793			
	C	104.39	13.058			
	D	112.07	17.834			

Table 2: Diastolic BP

Time	*Group*	*Mean (mmHg)*	*Std.Dev*	*Mean Square*	*F*	*p value*
1	A	78.98	10.431	167.338	1.641	0.18
	B	78.93	8.882			
	C	80.4	10.473			
	D	81.75	10.566			
2	A	72.48	14.646	821.518	6.126	<0.001
	B	74.06	10.32			
	C	76.26	10.876			
	D	79.38	9.971			
3	A	71.19	12.416	808.58	6.307	<0.001
	B	71.36	10.641			
	C	72.8	11.1			
	D	77.52	11.1			
4	A	63.7	12.53	190.359	1.39	0.245
	B	63.17	11.948			
	C	66.08	11.626			
	D	62.98	10.621			
5	A	62.91	11.929	206.197	1.569	0.196
	B	61.05	11.429			
	C	64.46	13.105			
	D	61.8	8.984			
6	A	72.36	16.779	2610.109	9.972	<0.001
	B	75.84	17.452			
	C	80.83	16.463			
	D	84.42	13.711			
7	A	65.84	15.445	2286.925	11.476	<0.001
	B	67.97	13.999			
	C	73.15	13.891			
	D	76.83	13.05			
8	A	59.34	11.745	2716.628	16.437	<0.001
	B	61.23	13.154			
	C	65.22	13.693			
	D	71.62	12.718			
9	A	58.42	10.905	2357.597	14.859	<0.001
	B	61.14	14.297			
	C	65.46	11.497			
	D	69.97	13.305			

5. Discussion

Significant intragroup ($p<0.001$) and intergroup ($p<0.001$) differences in systolic BP was noted in the study population during the period of observation at different time intervals.

Significant intergroup variations were seen at 10 minutes post infusion ($p=0.002$), 20 minutes post infusion ($p<0.001$), post induction ($p=0.03$), before intubation ($p=0.037$),1 minute post intubation , 2 minutes post intubation, 5 minutes post intubation, 10 minutes post intubation($p< 0.001$).

Significant intragroup ($p<0.001$) and intergroup ($p<0.001$) differences in diastolic BP were noted in the study population. Significant intergroup diastolic BP variations were noted at 10 minutes post infusion ($p<0.001$), 20 minutes post infusion ($p<0.001$),1 minute post intubation , 2 minutes post intubation, 5 minutes post intubation and 10 minutes post intubation ($p< 0.001$).

6. Conclusion

Attenuation of hemodynamic response was best seen with 1 µg/kg followed by 0.6 µg/kg while hemodynamic profiles of 0.3 µg/kg of dexmedetomidine and placebo group were similar. Hence we conclude that 1 µg/kg and 0.6 µg/kg of dexmedetomidine offer best desirable hemodynamic conditions.

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