Original Research Paper

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OBSERVATIONAL STUDY OF RECOVERY CRITERIA IN SURGICAL PATIENTS FROM DESFLURANE ANESTHESIA WITH AND WITHOUT DEXMEDETOMIDINE

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ABSTRACT

BACKGROUND: Desflurane is an inhalational anesthetic with lowest blood gas solubility coefficient, therefore associated with faster recovery. Dexmedetomidine is a selective α2 adrenoreceptor agonist with sedative, anxiolytic and analgesic properties.

MATERIALS & METHODS : Sixty patients of ASA grade I and II posted for elective surgeries were divided into 2 groups of 30 each, Group D patients received dexmedetomidine at 0.5mcg/kg/hr after induction until 10 minutes prior to completion of surgery while Group P patients received normal saline.

RESULT : Group D patients showed more stable haemodynamic parameters during and after extubation. Both groups showed similar time to extubation and response to verbal commands. Modified Alderete Score after extubation and time to rescue analgesia were significantly higher in Group D.

CONCLUSION : Intraoperative dexmedetomidine infusion with desflurane in general anesthesia provided a haemodynamically stable recovery and effective post operative analgesia.

KEYWORDS : Desflurane, Dexmedetomidine, Recovery

INTRODUCTION

Desflurane, a totally fluorinated methyl ethyl ether, was introduced in 1992. Its low solubility in blood allowed rapid induction of anesthesia, control of end-tidal anesthetic concentrations during maintenance of anesthesia, and quick recovery at the end of anesthesia independent of the duration of administration. It is one of the most commonly used volatile anaesthetic agent and has an excellent safety record. Dexmedetomidine is an alpha 2 adrenoceptor agonist, and has hypnotic, sedative, anxiolytic, sympatholytic and analgesic properties. It does not produce any significant respiratory depression. Acting on alpha 2 receptors , it produces sedation by decreasing sympathetic nervous system activity and the level of arousal. The result is a calm patient who is easily arousable to full consciousness. Sedative and hypnotic drugs reduce the anaesthetic and opioid requirements. Its sympatholytic effect decreases mean arterial pressure (MAP) and heart rate (HR) by decreasing the release of norepinephrine

MATERIAL AND METHODS

SOURCE OF DATA

STUDY SITE: SBKS MEDICAL INSTITUTE AND RESEARCH CENTRE, SUMANDEEP VIDYAPEETH, PIPARIYA, VADODARA, GUJARAT.

STUDY DURATION: The study was done for a period of one year and 6 months.

DESIGN OF STUDY: OBSERVATIONAL STUDY

SAMPLE SIZE: Keeping the power of study as 80% and confidence limit at 95%, to detect a 10% difference in hemodynamic parameters between the two groups after extubation , the minimum sample size required was 30 in each group. Hence 60 patients of Grade I and II of American Society of Anesthesiologist's(ASA) classification were admitted for elective surgeries under general anesthesia.

The study is observational in nature. All the patients participating in the study were explained clearly about the purpose and nature of the study in the language they understand. They were included in the study only after obtaining a written and informed consent. A cross sectional analysis was made at the time of presentation.

Inclusion criteria:

1. Patients who give written and informed consent.
2. Patients aged between 18 to 60 years.
3. Patients belonging to ASA Grade I and II.

Exclusion criteria:

1. Patient refusal
2. American society of anaesthesiology grade III and above.
3. Patients allergic to any drugs
4. Patients with history of malignant hyperthermia.

METHOD OF COLLECTION OF DATA

SAMPLING METHOD

Patients were randomly divided into two groups

GROUP D: DESFLURANE WITH DEXMEDETOMIDINE group – 30 patients

GROUP P: DESFLURANE WITHOUT DEXMEDETOMIDINE group – 30 patients

A routine pre-operative examination of all the patients who were to be included in the study was done on the previous day of surgery and routine investigations were carried out.

All selected patients were kept nil by mouth for 8 hrs prior to surgery.

Informed and written consent was taken.

PROCEDURE :

Patient was shifted to OT. An IV line was secured with 18 gauge iv cannula, an infusion of lactated Ringer's solution was started. All resuscitation equipments were kept ready.

The patient was connected to the monitors and the pre-induction systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP), heart rate (HR), and oxygen saturation (SpO_2) were recorded.

All the patients were premedicated with inj.glycopyrrolate 0.004mg/kg, inj ondensatron 4mg and inj fentanyl 1mcg/kg IV ten minutes before induction. Patients were preoxygenated with 100% O_2 for 3 minutes. Induction of anaesthesia was done with propofol 2.5 mg/kg, loss of eyelash reflexes was considered to be the end point, check ventilation was done, followed by inj succinylcholine 1.5-2mg/kg, and patient was intubated. After confirming the proper position of endotracheal tube, it was connected to anaesthesia machine. Patient was ventilated with 40% O_2 and 60% N_2O with desflurane. Inj atracurium 0.5 mg/kg iv was given as loading dose. Dexmedetomidine infusion at 0.5 mcg/kg/hr was started immediately after induction in Group D patients while Group P patients received normal saline. Anesthesia was maintained with desflurane in 60% nitrous oxide in oxygen and intermittent doses of inj atracurium 0.1mg/kg. Desflurane concentration was adjusted accordingly for the adequate depth of anesthesia. Dexmedetomidine was stopped 10 minutes prior to the

completion of surgery. Desflurane was cut off at the beginning of skin closure. This indicated the commencement of recovery period.

At the end of the surgery, neuromuscular blockade was reversed by using intravenous neostigmine 0.05mg/kg and glycopyrrolate 8 mcg/kg. After adequate recovery of reflexes, proper suctioning was done and patient was extubated. Patient was shifted to recovery room after extubation and was monitored for 24 hours.

Parameters monitored:

Pulse rate, Systolic BP, Diastolic BP

1. Before induction.
2. After induction.
3. At 1 ,5 and 10 minutes after intubation.
4. At 1 , 5 and 10 minutes after extubation.

- Time for extubation
- Response to verbal command
- Modified Aldretes score at 5 minutes and 10 minutes after extubation.
- Visual Analog Score(VAS) every half an hour till VAS>3.

When VAS>3 then rescue analgesia in terms of Inj diclofenac 75mg iv was given.

STATISTICAL ANALYSIS :

Data was analysed by Graph Pad Prism. Statistical analysis was done with non paired student t-test for continuous data. Results were expressed as mean ± SD. The inference based on p value was made as follows :-

$p>0.05$ – Non significant
$p<0.05$ – significant
$p<0.01$ – highly significant

Microsoft word and excel were used to generate graphs and tables.

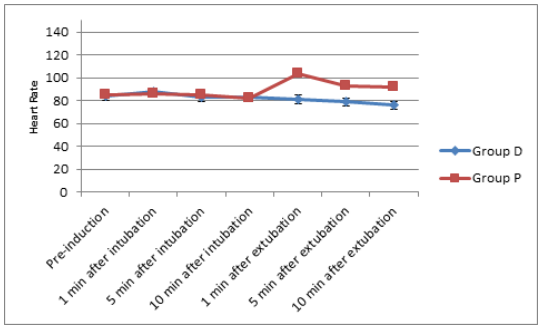
TABLE 1 : Modified Aldrete's Scoring[9]

Level of consciousness Score	
Awake and oriented	2
Arousable with minimal stimulation	1
Responsive only to tactile stimulation	0
Physical activity	
Able to move all extremities on Command	2
Some weakness in movement of extremities	1
Unable to voluntarily move extremities	0
Haemodynamic stability	
Blood pressure, 15% of baseline MAP value	2
Blood pressure 15%-30% of baseline MAP value	1
Blood pressure .30% below baseline MAP value	0
Respiratory stability	
Able to breathe deeply	2
Tachypnea with good cough	1
Dyspneic with weak cough	0
Oxygen saturation status	
Maintains value .90% on room air	2
Requires supplemental oxygen (nasal prongs)	1
Saturation, 90% with supplemental oxygen	0
Postoperative pain assessment	
None or mild discomfort	2
Moderate to severe pain controlled with IV analgesics	1
Persistent severe pain	0
Postoperative emetic symptoms	
None or mild nausea with no active vomiting	2
Transient vomiting or retching	1
Persistent moderate to severe nausea and vomiting	0
Total score 14	

OBSERVATIONS AND RESULTS

Demographic variables like age, gender distribution, weight, ASA grading were comparable between the two groups.

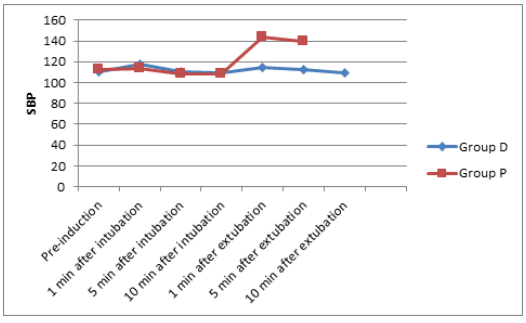
FIGURE 1 : COMPARISON OF HEART RATE BETWEEN THE TWO GROUPS



Pre-Induction heart rate was similar in both the groups.

Heart rate was significant higher in Group P as compared to Group D at 1, 5 and 10 minutes after extubation.

FIGURE 2 : COMPARISON OF SBP BETWEEN THE TWO GROUPS.

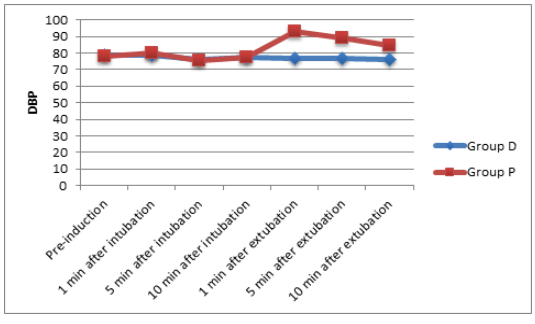


Pre-induction SBP was comparable in both the groups.

SBP was comparable in both groups 1, 5 and 10 minutes after intubation.

SBP was significantly higher in Group P as compared to Group D 1, 5 and 10 minutes after extubation.

FIGURE 3 : COMPARISON OF DBP BETWEEN TWO GROUPS



Pre-induction DBP was similar in both the groups.

DBP was comparable in both groups 1, 5 and 10 minutes after intubation.

DBP was significantly higher in Group P as compared to Group D 1, 5 and 10 minutes after extubation.

TABLE 2 : COMPARISON OF RECOVERY PARAMETERS BETWEEN BOTH GROUPS

	Group D	**Group P**	**p value**
Time for extubation (min)	8.13±0.77	7.93±0.90	0.69
Response to verbal commands (min)	9.66±0.84	9.36±0.99	0.21
Modified Alderete Score at 5 min	7.5±0.5	6.36±0.49	<0.001
Modified Alderete Score at 10 min	9.33±0.47	7.96±0.66	<0.001
Time to rescue analgesia(in minutes)	137±21.83	24.16±6.57	<0.001

The time for extubation in Group D(8.13±0.77 mins) was comparable to Group P(7.93±0.90 mins) (p=0.69).Response to verbal commands in Group D(9.66±0.84 min) was statistically similar to Group P(9.36±0.99 min) (p=0.21) The Modified Aldrete Score is significantly lower in Group P as compared to Group D at 5 and 10 minutes after extubation (p<0.001). The time to rescue analgesia (VAS>3) is significantly higher in Group D(137 ±21.83 min) as compared to Group P(24.16±6.57) (p<0.001).

DISCUSSION

The demographic data in terms of age, sex and weight were comparable in both the groups of the study.

Hemodynamic parameters:

- Laryngoscopy, intubation, emergence from anesthesia, extubation are all crucial phases hemodynamically.
- One of the benefits of dexmedetomidine is that, it significantly reduces the release of catecholamine and thus attenuates increase in systemic vascular resistance and heart rate. These adverse hemodynamic changes can be abolished with dexmedetomidine infusion thus preventing any complications.[13]
- In our study, pre-induction HR, SBP and DBP were comparable in both the groups(p>0.05). HR, SBP and DBP were statistically comparable in both the groups at 1, 5 and 10 minutes after intubation.(p>0.05)
- HR, SBP and DBP at 1, 5 and 10 minutes after extubation were significantly higher in Group P compared to group D (p<0.001).
- Similar results have been observed in other studies.(Bekker et al[1] , Kim SY et al[3], Manne GR et al[4])

TIME FOR EXTUBATION & RESPONSE TO VERBAL COMMANDS:

- In our study we observed that time for extubation (p=0.69) and time to respond to verbal commands (p=0.21) were statistically comparable in both the groups. This is due to the fact that dexmedetomidine does not seem to cause significant respiratory depression .[8] Sedation produced by α2 agonists is different in the sense that the patients can be easily aroused and also respond to the verbal commands and then can return to sleep like state when not stimulated.[4]
- Bhattacharjee et al[7] observed dexmedetomidine caused sedation but does not cause any delay in extubation time and response to verbal commands.

Modified Aldrete Score:

- The Modified Aldrete scores at 5 and 10 minutes after extubation were significantly higher in Group D as compared to Group P (p<0.001). The above observations are similar to the observations by Keles et al[2].

TIME TO RESCUE ANALGESIA (VAS>3) :

- We observed a significant increase in the time to receive rescue analgesia (VAS>3) in Group D as compared to Group P (p<0.001). Post-operative analgesic effects of intra-operative dexmedetomidine infusion have also been discussed in studies by Bhattacharjee[7], Manne GR[4], Panchgar V[6].

Post-operative analgesic effects of intra-operative dexmedetomidine infusion have also been discussed in studies by Bhattacharjee et al[18] , Ge D et al[12] and McQueen-Shadfar LA et al[23].

In our study, no significant side-effects were observed in both the groups.

CONCLUSION

Our study concludes that intraoperative dexmedetomidine infusion at 0.5 mcg/kg/hr with desflurane in general anesthesia provides a haemodynamically more stable recovery and effective post operative analgesia compared to desflurane alone, without causing delay in extubation time and response to verbal commands.

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