



A COMPARISON OF RECOVERY PROFILE AND POSTOPERATIVE HEMODYNAMICS BETWEEN DEXMEDETOMIDINE AND ESMOLOL FOLLOWING THEIR INTRAOPERATIVE ADMINISTRATION

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ABSTRACT

Background and goals of study: Dexmedetomidine and Esmolol are used intraoperatively for many indications. This study compares the recovery profile and postoperative hemodynamics, along with the postoperative analgesic requirement following intraoperative usage of Dexmedetomidine and Esmolol as hypotensive agents during General Anesthesia

Methods: We included 60 ASA I & II patients in the study. Patients were randomly allocated to two groups. Group A (n= 30) : Patients receiving Dexmedetomidine. Group B (n= 30) : Patients receiving Esmolol. In Group A, patients received loading dose of 1 µg/kg Dexmedetomidine diluted in 10 ml 0.9% saline infused over 10 min, before induction of anesthesia, followed by continuous infusion of 0.4–0.8 µg/kg/h. In Group B, patients received Esmolol as a loading dose 1 mg/kg, infused over 1 min, before induction of anesthesia, followed by continuous infusion of 0.4-0.8 mg/kg/h. The recovery profile was assessed using Modified Aldrete Score. Postoperative hemodynamics, sedation score and analgesic request are compared. **Results:** The emergence time and the time to attain modified Aldrete score ≥9 was significantly longer in Dexmedetomidine group. The pulse rates and blood pressures were significantly higher in the Esmolol group both during the immediate postoperative period as well as in the PACU. The sedation score in the PACU was higher in the Dexmedetomidine group. The first analgesic request was significantly earlier in the Esmolol group. **Conclusion:** Dexmedetomidine is associated with delayed recovery and higher sedation scores, but better hemodynamics and analgesia during the postoperative period, when compared with Esmolol.

KEYWORDS : Dexmedetomidine, Esmolol, Recovery, Sedation score

INTRODUCTION: Dexmedetomidine, a centrally acting α-2 agonist, has been used in achieving controlled hypotension. Dexmedetomidine has sedative, analgesic and anesthetic sparing effects, which are very beneficial.

Esmolol is an ultra short acting selective β-1 adrenergic antagonist that is frequently used for induced hypotension. Esmolol also has additional advantages of opioid sparing effect and reduced postoperative analgesic requirement¹. Intraoperative use of esmolol reduces anesthetic requirements and reduces the use of opioids perioperatively²⁻¹⁰.

This study is designed to compare the recovery profile and postoperative hemodynamics along with postoperative analgesic requirement following intraoperative use of Dexmedetomidine and Esmolol.

Methodology:

This is a prospective, randomized, analytical comparative study. Ethical committee approval & written informed patient consent were obtained. The aim of the study was to compare the recovery profile and postoperative hemodynamics along with postoperative analgesic requirement taking into account the following:

- The interval between the discontinuation of anesthetics to response of eye opening to verbal command and time to extubation
- Time to attain Modified Aldrete Score ≥ 9
- Sedation score, pain score, nausea & vomiting post operatively
- Time to first analgesic request
- Any complications

Sixty patients were studied, randomized into two groups of 30 each. Simple randomized sampling was done by computer generated random numbers.

Patients were allocated into three groups:

- Group A (n= 30) : Patients receiving Dexmedetomidine
- Group B (n= 30) : Patients receiving Esmolol

Patients belonging to age 20-50 yrs and ASA I & II classes were included in the study. Patients belonging to ASA grade III and IV, those with known allergy to study drug, hypertension, coagulopathies or receiving drugs influencing blood coagulation, coronary artery disease, renal, hepatic or cerebral insufficiency, and patients on adrenergic blocking drugs were excluded from the study. All patients were premedicated with IV Glycopyrrolate 5µg/kg and IV Midazolam 0.05 mg/kg. Patients were induced with IV Propofol 1-2 mg/kg. IV Fentanyl 2µg/kg was given for intraoperative analgesia. Endotracheal intubation was facilitated with IV Atracurium 0.5 mg/kg with suitable sized cuffed tube. Anesthesia was maintained with Sevoflurane 1.5%. All patients were mechanically ventilated with Nitrous oxide and oxygen (60% : 40%).

In Group A, patients received loading dose of 1 µg/kg Dexmedetomidine diluted in 10 ml 0.9% saline infused over 10 min, before induction of anesthesia, followed by continuous infusion of 0.4–0.8 µg/kg/h.

In Group B, patients received Esmolol as a loading dose 1 mg/kg, infused over 1 min, before induction of anesthesia, followed by continuous infusion of 0.4-0.8 mg/kg/h.

Hemodynamic parameters such as Pulse Rate, Non invasive blood pressure (Systolic Blood Pressure, Diastolic Blood Pressure & Mean Arterial Pressure), End Tidal Carbon dioxide and SPO₂ were recorded every minute for the first 5 minutes and every 5 minutes during the first hour, and every 15 minutes thereafter, until the end of surgery.

Intraoperatively, the Mean Arterial Pressure was maintained within a range of 55-65 mmHg, by adjusting the dose of the study drug within the dose range specified earlier.

Infusion of the study drug was stopped five minutes before the anticipated end of surgery. Sevoflurane was stopped at the end of the surgery. Residual neuromuscular blockade was reversed with Neostigmine (0.05 mg/kg) and Glycopyrrolate (0.01 mg/kg).

Modified Aldrete Score

The time interval between discontinuation of anaesthetics and response of eye opening to verbal command is recorded. The time interval between discontinuation of anaesthetics and extubation is also recorded.

Postoperative recovery was evaluated using a Modified Aldrete Score 11 (0-10), and time needed to achieve ≥ 9 was recorded.

Patients were shifted to the postoperative ward once a Modified Aldrete Score of ≥ 9 was attained. Sedation score was measured using the Modified Ramsay Sedation Scale 12 at 15, 30 and 60 minutes after tracheal extubation.

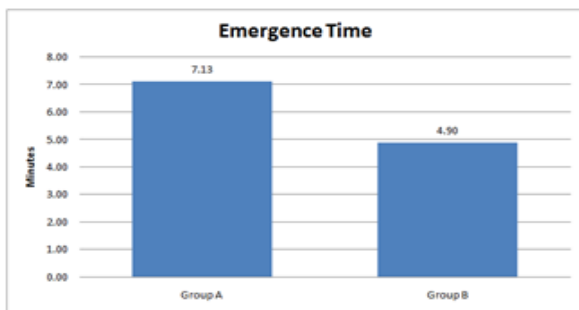
Post operative analgesia was assessed by the time to first analgesic request by the patient. Patients were monitored in the postoperative ward for any complications including nausea, vomiting, bradycardia or tachycardia, hypotension or hypertension, etc. during the first 24 hours following surgery.

Motor Activity	Able to move four extremities	2
	Able to move two extremities on command	1
	Able to move no extremity on command	0
Breathing	Able to breathe deeply and cough freely	2
	Dyspnea / Shallow Breathing	1
	Apnea	0
Circulation	Systemic Blood Pressure ± 20 mmHg of preoperative level	2
	Systemic Blood Pressure $\pm 20-50$ mmHg of the preoperative level	1
	Systemic Blood Pressure ± 50 mmHg of preoperative level	0
Consciousness	Fully awake	2
	Arousable	1
	Not responding	0
Oxygen Saturation	$>92\%$ while breathing room air	2
	Needs supplemental oxygen to maintain oxygen saturation $>90\%$	1
	$<90\%$ even with oxygen	0

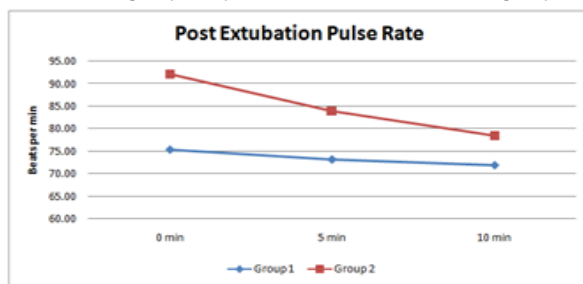
1	anxious, agitated, or restless
2	cooperative, oriented, and tranquil
3	responsive to commands
4	asleep, but with brisk response to light, glabellar tap, or loud auditory stimulus
5	asleep, sluggish response to glabellar tap, or auditory stimulus
6	asleep, no response

RESULTS:

The emergence time was significantly longer in the Dexmedetomidine group compared to the Esmolol group.

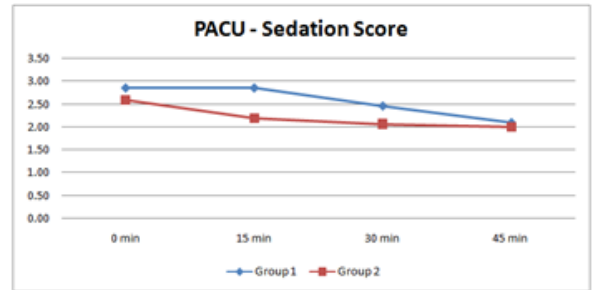


The post-extubation pulse rate, systolic blood pressure, diastolic blood pressure and mean arterial pressure were significantly higher in the Esmolol group compared to the Dexmedetomidine group.



In the PACU, the pulse rates were significantly higher in the Esmolol group during the first 45 min postoperative. The blood pressures were significantly higher in the Esmolol group during the first 30 min in the PACU.

The sedation score was significantly higher in the Dexmedetomidine group at 15 and 30 minutes in the PACU.



The first analgesic request was significantly earlier in the Esmolol group

FIRST ANALGESIC REQUEST

Parameter	Group A	Group B
Range	45 - 68	20 - 45
Mean	53.23	30.67
S.D.	5.84	6.48
'p'	<0.0001 Significant	

DISCUSSION:

Emergence time, measured as the time between stoppage of anesthetic agents to response to commands, was significantly longer in the Dexmedetomidine group (7.13 ± 1.01 vs 4.90 ± 1.21 ; p value <0.0001). So we conclude that Dexmedetomidine results in a delayed recovery compared to Esmolol.

The pulse rate, systolic blood pressure, diastolic blood pressure and mean arterial pressure were significantly lower in the Dexmedetomidine group at 0 min, 5 min and 10 min following extubation. The time to reach Modified Aldrete Score of ≥ 9 was significantly longer in the Dexmedetomidine group.

In the PACU, the pulse rates of the patients belonging to Esmolol group were significantly higher than those in Dexmedetomidine group at admission to PACU, 15 min, 30 min and 45 min in PACU. Systolic and diastolic blood pressures were significantly higher in the Esmolol group during the first 30 min in PACU. By 45 min, the systolic and diastolic blood pressures were comparable between the two groups. Sedation score was comparable between the two groups at admission to PACU. During the first 30 min following admission to PACU, the sedation score of the patients in the Esmolol group were lower, indicating a faster wear off of sedation compared to Dexmedetomidine group. But, at 45 mins in PACU, the sedation score of patients belonging to both the groups became comparable. The first analgesic request was significantly earlier in the Esmolol group compared to the Dexmedetomidine group (53.23 ± 5.84 min vs 30.67 ± 6.48 ; p value <0.0001). So we conclude that post operative pain relief is significantly better with Dexmedetomidine compared to Esmolol.

CONCLUSION:

Dexmedetomidine is associated with delayed recovery and higher sedation scores, but better hemodynamics and analgesia during the postoperative period, when compared with Esmolol.

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