

ORIGINAL RESEARCH

## Assessment Of Dexmedetomidine Infusion During Middle Ear Surgery Under General Anaesthesia

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### ABSTRACT

**Background:** Numerous pharmacological agents effectively lower the systemic blood pressure for hypotensive anaesthesia techniques. The present study was conducted to assess dexmedetomidine infusion during middle ear surgery under general anaesthesia.

**Materials & Methods:** 50 adults scheduled for elective middle ear surgery of both genders were divided into two groups of 25 each. Group I received infusion of dexmedetomidine 0.5 µg/kg/h and group II received placebo infusion of normal saline during middle ear surgery. Intra-operatively, the heart rate, arterial blood pressure, ECG, EtCO<sub>2</sub> and peripheral pulse oximetry (SpO<sub>2</sub>) were monitored and recorded at 5 min intervals till end of surgery. The mean surgery time and isoflurane requirement was recorded.

**Results:** Group I had 12 males and 13 females and group II had 11 males and 14 females. ASA grade I was seen in 20 in group I and 19 in group II and II in 5 in group I and 6 in group II. The mean heart rate at baseline was 94.5 in group I and 92.1 in group II, after induction was 74.2 in group I and 70.6 in group II, after intubation was 76.4 in group I and 75.2 in group II and after extubation was 82.6 in group I and 96.4 in group II. Percentage of isoflurane requirement was 0.9 in group I and 1.5 in group II and the mean surgery time was 95.4 minutes in group I and 104.2 minutes in group II. The difference was significant (P < 0.05).

**Conclusion:** Dexmedetomidine infusion provided sufficient oligoemic surgical field for better visualisation under operating microscope for middle ear surgery.

**Key words:** Dexmedetomidine, middle ear surgery, Pharmacological

### INTRODUCTION

Middle ear is a closed air-filled cavity between the tympanic membrane and oval window. Surgeries done here under operating microscope need bloodless field for better visualisation. This bloodless field is achieved through controlled or deliberate hypotension. Controlled or deliberate hypotension can be achieved through multiple modalities. Pharmacological and non-pharmacological means can be used to achieve controlled hypotension.<sup>2</sup>

Numerous pharmacological agents effectively lower the systemic blood pressure for hypotensive anaesthesia techniques. Sodium nitroprusside and nitroglycerine precisely control the blood pressure due to their rapid onset and short duration of action, but intra-

arterial blood pressure monitoring and electrocardiogram (ECG) with S-T segment analysis are mandatory. An infusion of 10 - 20 µg/kg/h remifentanyl is also useful but is associated with side effect of hyperalgesia.<sup>2</sup>

Dexmedetomidine, a centrally acting alpha 2 agonist is being used in many countries since many years. It is valuable because of its anaesthetic and analgesic-sparing effects with predictable and dose-dependent haemodynamic effects.<sup>3</sup> It regulates the autonomic and cardiovascular systems by acting on blood vessels and inhibiting norepinephrine release at sympathetic terminals, thereby attenuating the heart rate and blood pressure responses to intra-operative stressful events of anaesthesia.<sup>4</sup> It effectively minimises the surgical blood loss and improves the surgical field visibility. Its haemodynamic effects are predictable and dose-dependent.<sup>5</sup> The present study was conducted to assess dexmedetomidine infusion during middle ear surgery under general anaesthesia.

## MATERIALS & METHODS

The present study comprised of 50 adults of scheduled for elective middle ear surgery of both genders. All gave their written consent for the participation in the study.

Data such as name, age, gender etc. was recorded. Patients were divided into two groups of 25 each. Group I received infusion of dexmedetomidine 0.5 µg/kg/h and group II received placebo infusion of normal saline during middle ear surgery after induction of anaesthesia till 20 min before completion of surgery. Intra-operatively, the heart rate, arterial blood pressure, ECG, EtCO<sub>2</sub> and peripheral pulse oximetry (SpO<sub>2</sub>) were monitored and recorded at 5 min intervals till end of the surgery. The mean surgery time and isoflurane requirement was recorded. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

## RESULTS

**Table I: Distribution of patients**

Groups	Group I	Group II
Drug	dexmedetomidine 0.5 µg/kg/h	normal saline
M:F	12:13	11:14

Table I shows that group I had 12 males and 13 females and group II had 11 males and 14 females.

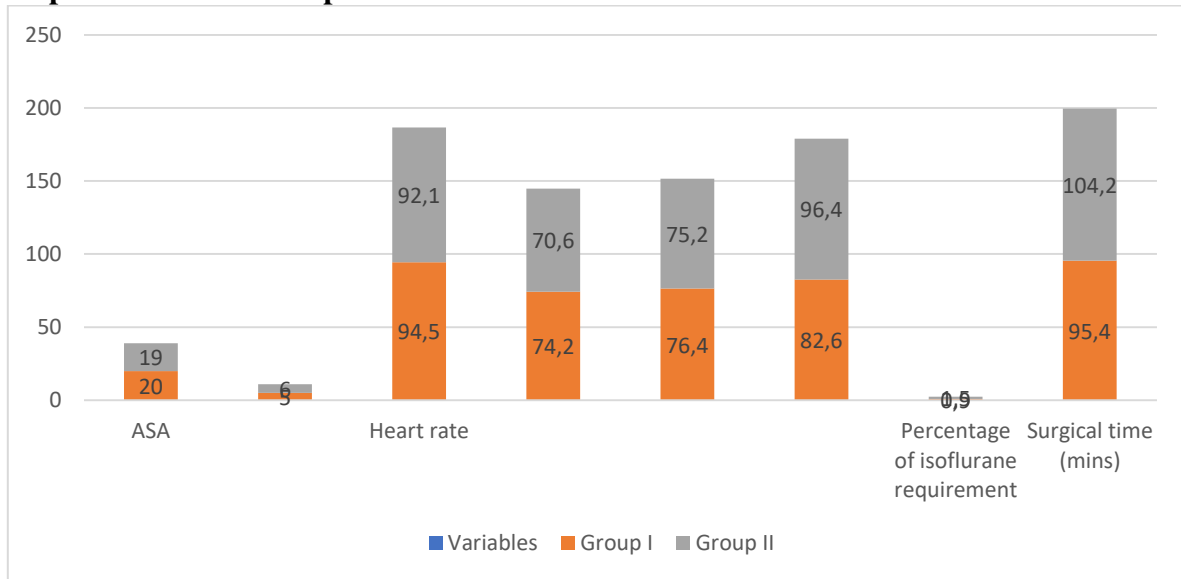
**Table II: Assessment of parameters**

Parameters	Variables	Group I	Group II	P value
ASA	I	20	19	0.01
	II	5	6	
Heart rate	Baseline	94.5	92.1	0.05
	After induction	74.2	70.6	
	After intubation	76.4	75.2	
	After extubation	82.6	96.4	
Percentage of isoflurane requirement		0.9	1.5	0.02
Surgical time (mins)		95.4	104.2	0.04

Table II, graph I shows that ASA grade I was seen in 20 in group I and 19 in group II ; and ASA grade II in 5 in group I and 6 in group II. The mean heart rate at baseline was 94.5 in group I and 92.1 in group II, after induction was 74.2 in group I and 70.6 in group II, after intubation was 76.4 in group I and 75.2 in group II and after extubation was 82.6 in group I and 96.4 in group II. Percentage of isoflurane requirement was 0.9 in group I and 1.5 in group II.

II and the mean surgery time was 95.4 minutes in group I and 104.2 minutes in group II. The difference was significant ( $P < 0.05$ ).

**Graph I: Assessment of parameters**



## DISCUSSION

Dexmedetomidine is an imidazole compound, active dextro isomer of medetomidine that shows selective and specific agonism to alpha 2 receptors.<sup>6,7</sup> Neuronal hyperpolarization is the key action of alpha2 agonists.<sup>8</sup> Thus, activation of alpha 2 receptors in the brain and spinal cord inhibits neuronal firing, inhibits the release of nor epinephrine and terminates pain signals at presynaptic levels, post-synaptically at the CNS causes sympatholysis.<sup>9</sup> A combined effect leads to hypotension, bradycardia, sedation, and anxiolysis.<sup>10</sup> The present study was conducted to assess dexmedetomidine infusion during middle ear surgery under general anaesthesia.

We found that group I had 12 males and 13 females and group II had 11 males and 14 females. Gupta et al<sup>11</sup> in their study sixty four adult patients aged 18-58 years were randomised into two comparable equal groups of 32 patients each for middle ear surgery under general anaesthesia with standard anaesthetic technique. After induction of general anaesthesia, patients of Group I were given dexmedetomidine infusion of 0.5 µg/kg/h and patients of Group II were given placebo infusion of normal saline. Isoflurane concentration was titrated to achieve a systolic blood pressure 30% below the baseline value. All patients were assessed intra-operatively for bleeding at surgical field, haemodynamic changes, awakening time and post-operative recovery. Statistically significant reduction was observed in the required percentage of isoflurane ( $0.8 \pm 0.6\%$ ) to maintain the systolic blood pressure 30% below the baseline values in patients receiving dexmedetomidine infusion when compared to those receiving placebo infusion ( $1.6 \pm 0.7\%$ ). Patients receiving dexmedetomidine infusion had statistically significant lesser bleeding at surgical field ( $P < 0.05$ ). The mean awakening time and recovery from anaesthesia did not show any significant difference between the groups.

We found that ASA grade I was seen in 20 in group I and 19 in group II and II in 5 in group I and 6 in group II. The mean heart rate at baseline was 94.5 in group I and 92.1 in group II, after induction was 74.2 in group I and 70.6 in group II, after intubation was 76.4 in group I and 75.2 in group II and after extubation was 82.6 in group I and 96.4 in group II. Percentage of isoflurane requirement was 0.9 in group I and 1.5 in group II and the mean surgery time was 95.4 minutes in group I and 104.2 minutes in group II. Sarkar et al<sup>12</sup> assessed the

effectiveness of dexmedetomidine in reducing blood loss during middle ear surgery under general anaesthesia in 54 adult patients. 27 patients received dexmedetomidine loading dose of 1mcg/kg/hour over 10 mins followed by steady infusion of 0.4mcg/kg/hour, while 27 other patients received same volume of normal saline as placebo. Dexmedetomidine showed significantly lower bleeding intraoperatively and at end of surgery opinion by surgeon than placebo.

Nasreen et al<sup>13</sup> assessed the hypotensive effect of low does dexmedetomidine infusion during middle ear surgery in 42 adult patients. Results showed significant reduction in the percentage of halothane required to reduce mean arterial pressure 30% below control value in dexmedetomidine group  $1.3\pm 0.4$  than placebo group  $3.1\pm 0.3$ . Patient receiving dexmedetomidine had a better surgical field as compared to patients receiving placebo. The study concluded that dexmedetomidine can be safely administered to provide hypotensive anaesthesia during middle ear surgery keeping the hemodynamic fluctuations within the physiological range.

The limitation the study is small sample size.

## CONCLUSION

Authors found that dexmedetomidine infusion provided sufficient oligoemic surgical field for better visualisation under operating microscope for middle ear surgery.

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