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Original Research Article

# Effect of Dexmedetomidine Infusion for Procedural Sedation and Haemodynamic Variability in ENT Surgery under Local Anesthesia

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**Abstract:**

**Background:** A large number of ENT surgeries are done under local anesthesia and patient should be calm and quiet. At the same time response to verbal command to be maintained. Low BP and reduced pulse rate are other essential requirement to reduce bleeding .The haemodynamic response occurs due to increase in sympathetic and sympatho-adrenal activity. It has become evident that, $\alpha_2$-adrenoceptor agonists may be a useful class of drugs to reduce this response. In this study we observed the effects of dexmedetomidine, a highly selective and potent $\alpha_2$ agonist on haemodynamic variability and sedation score during different ENT surgeries under local anesthesia.

**Materials & Methods:** About 60 patients undergoing elective ENT surgery under local anesthesia (tympanoplasty, mastoidectomy and septoplasty) were included in this study and were divided equally into two groups in a randomized double blind protocol. Group D were received 0.5 µg/kg/hr dexmedetomidine by syringe pump as maintenance dose 10 min before and was stopped 10 min before the end of operation and Group P were receive 0.9% NS at same rate by syringe pump as per Group D. Requirement of supplemental and subsequent doses of fentanyl (1µg/kg every time) in both group were recorded.

**Results:** In Group D, MAP was between 65-75 mm of Hg and in 90% of cases sedation score were 3 (as per Filo's numerical score). In Group P, MAP was between 90-98 mm of Hg and in 70% of cases sedation score was 1.

**Conclusion:** To conclude dexmedetomidine is a very effective drug in reducing intraoperative BP and maintaining a proper sedation.

**Keywords**: ENT Surgery, Local Anesthesia, Dexmedetomidine, Haemodynamic Variability, Fentanyl.



## Introduction

In 1999 dexmedetomidine has been approved as a α2-agonist by FDA for sedation in adult patients in the ICU setting. Previous clinical studies demonstrate how the use of dexmedetomidine reduces requirements of intravenous and inhalational anesthetic agents, provides intraoperative hemodynamic stability and also reduces the requirements of opioid analgesics in postoperative period.[1-6] In the ICU dexmedetomidine facilitate weaning from mechanical ventilation and improve quality of sedation and pain control for postoperative sedation in patients following cardiac surgery has been described in multiple clinical trials.[7-10] But there is limited information about the intraoperative use of dexmedetomidine as a coadjuvant of the anesthetic technique in surgery.

## Materials and Methods

After approval from our institutional ethics committee, patients undergoing elective ENT surgery under local anesthesia (tympanoplasty, mastoidectomy and septoplasty) who met the inclusion criteria were included in this study. Standard monitoring was used including non-invasive arterial blood pressure (NIBP), heart rate (HR), and pulse oximetry ($SPO_2$). All patients who met the inclusion criteria were given

0.05mg/kg inj. Butorphanol. Surgeon used local anesthetics {inj. Lignocaine 2%+ adrenaline (1 in 200000)}. Patients were randomly assigned to 1 of the 2 groups by an independent nurse who was not involved in this study. Group D was received 0.5 µg/kg dexmedetomidine by syringe pump as maintenance dose 10 min before and was stopped 10 min before end of operation and Group P was received 0.9% NS at same rate by syringe pump as per Group D. Requirement of supplemental and subsequent doses of fentanyl (1 mcg/kg every time) in both group were recorded. All medications were provided by an independent anaesthesiologist. The patients were followed for heart rate and blood pressure, $SPO_2$ before OT and then every 5 minutes for first 30 minutes, every 10 minutes until the end of surgery.

The patients were also followed for sedation and pain for every 15 minutes. The randomization result was not disclosed until data analysis to ensure blinding. Different statistical test was done accordingly.

**Results**

**Table 1: Base line characteristics in 2 groups**

| Characteristics | Group D [Mean (SD)] | Group P [Mean (SD)] | p value |
|---|---|---|---|
| Age (yrs) | 40.03 (7.044) | 39.63 (6.435) | 0.819 |
| Weight (Kg) | 53.53 (4.024) | 53.97 (4.50) | 0.696 |
| Height (mts) | 1.598 (0.037) | 1.591 (0.039) | 0.461 |
| BMI (Kg/m2) | 20.99 (1.76) | 21.34 (1.83) | 0.445 |
| ASA 1 | 19.0 | 19.0 | 1.000 |
| ASA 2 | 11.0 | 11.0 | |

Baseline characteristics are comparable in 2 groups, as there was no statistically significant difference among the 2 groups (Table 1, 2, 3).

**Table 2: Resultant heart rate and BP in 2 groups**

| Characteristics | Group D [Mean (SD)] | Group P [Mean (SD)] | p value |
|---|---|---|---|
| Heart rate | 63.10 (3.60) | 76.07 (6.181) | 0.000 |
| BP (MAP)# | 70.10 (3.63) | 94.13 (2.42) | 0.000 |

**#BP- blood pressure, MAP- means arterial pressure**

**Table 3: Chi square test**

| Characteristics | Group D [Mean (SD)] | Group P [Mean (SD)] | p value |
|---|---|---|---|
| Sedation Score | | | |
| 1 | 1(4.5) | 21(95.5) | 0.000 |
| 2 | 2 (25) | 6 (75) | |
| 3 | 27 (90) | 3 (10) | |
| 1st Dose Fentanyl | | | |
| Required | 4 (19) | 17 (81) | 0.000 |
| Not required | 26 (66.7) | 13 (33.3) | |
| Subsequent dose Fentanyl* | | | |
| Required | 1 (16.7) | 5 (83.3) | 0.195 |
| Not required | 29 (53.7) | 25 (46.3) | |

**Discussion**

A large number of ear and nose surgery are done under local anesthesia. During the operation, patient should be calm and quiet and at the same time response to verbal command to be maintained. Induced hypotension and reduced pulse rate are another essential requirement in ENT procedure to reduce bleeding .The hemodynamic response, which is part of a huge spectrum of stress response, occurs due to increase in sympathetic and sympathoadrenal activity, as evidenced by increased plasma catecholamines concentrations in patients undergoing surgery.[11-15] Various drug regimens and techniques have been used for attenuating the stress response, like opioids, barbiturates, benzodiazepines, beta blockers, calcium channel blockers, vasodilators, etc.[15-19] The dose of opioids required for effective attenuation of stress response is fairly high and numerous drugs have been used as adjuncts in decreasing the dose of opioids with encountered a varied level of success, but are not absolutely free from side-effects. [19-21]

It has become evident that, α2adrenoceptor agonists may also be a useful class of drugs in conjunction with anesthesia. [22] They simultaneously potentiate the effects of general anesthetic agents, reduce their dose requirements and attenuate sympathoadrenal responses to noxious stimuli during anesthesia and surgery, thus providing improved haemodynamic, metabolic and hormonal stability. [23] Dexmedetomidine is a highly selective and potent α2adrenoceptor agonist. It is a pure α2adrenoceptor agonist in some

pharmacological models in which clonidine has shown only partial agonistic activity. Dexmedetomidine is pharmacologically related to clonidine which is a α2 agonist but it has 8 times more affinity than clonidine for α2 receptor. It produces sedation and anxiolysis by binding to α2 receptor in the locus ceruleus, which diminishes release of norepinephrine and inhibits sympathetic activity. By these actions it reduces heart rate and blood pressure. It also produces analgesia by binding to α2 adrenoceptors in the spinal cord. [24]

Dexmedetomidine is useful in blunting haemodynamic responses in perioperative period, due to its central sympatholytic effect. To attenuate intubation response it is used in intravenous doses varying from 0.25 to 1 mcg/kg.[25-28] Optimal dose for attenuating pressor response seems to be 1 mcg/kg with lesser doses not being effective. [28] Infusion continued into the postoperative period has been associated with reduced haemodynamic fluctuations and decrease in plasma catecholamines. [26] Approx 0.5 mcg/kg dose not only blunt the extubation response but also reduce the emergence reaction and analgesic requirement to extubation following rhinoplasty and neurosurgery.

There is no delay in recovery or prolonged sedation when boluses are administered before induction or before extubation. [29,30] The major side effects of dexmedetomidine are bradycardia and hypotension. Bradycardia occurs due to reflex response for transient hypertension during initial part of infusion. Subsequent decrease in heart rate is due to decrease in central sympathetic outflow.

Hypotension occurs due to decreased central sympathetic outflow. Transient hypertensive response has been observed with higher doses (1–4 mcg/kg). This is attributed to initial stimulation of α-2B receptors present in vascular smooth muscles. This hypertensive episode settles once there is decrease in central sympathetic outflow. [31]

## Conclusion

To conclude dexmedetomidine effectively decrease heart rate, blood pressure, algesia and also causes effective sedation which are required during some type of ENT surgery under local anaesthsia.

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