Translational Perioperative and Pain Medicine

ISSN: 2330-4871

Research Letter | Open Access Volume 7 | Issue 4

# Efficacy of Dexmedetomidine Infusion to Attenuate Hemodynamic Response and Opioid Sparing Properties During Wide Excision of Carcinoma Tongue

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Head and neck surgical resections involve accelerated hypertensive surges especially during resection of tumor [1]. When wide local excision (WLE) of tongue lesion is performed for carcinoma tongue, it is associated with significant hemodynamic response. During the incision there is accelerated hypertension, tachycardia and surgical bleeding. This unwanted hemodynamic response in not desirable in hypertensive patients, patients with coronary and cerebrovascular disease. This is addressed using incremental doses of opioids, increasing depth of anesthesia, IV (intravenous) beta blockers, propofol boluses or nitroglycerine infusion [2]. This addresses the hemodynamic issues but is associated with hypotension once the glossectomy is done. This requires use of vasopressors and unnecessary stay in a dependency unit for stabilizing hemodynamics.

Dexmedetomidine is a centrally acting α2 agonist which causes sympatholysis and thereby attenuates hemodynamic response to intubation, surgical incision [3]. We hypothesized that by using dexmedetomidine infusion in recommended doses during WLE of tongue lesions there could be attenuation of hemodynamic response during surgical incision and also would reduce intraoperative opioid consumption.

After Institutional Ethics Committee approval, 20 American Society of Anesthesiologists'-physical status (ASA-PS) I-II patients with carcinoma tongue scheduled for WLE of tongue lesion were enrolled randomly for this study. One group was offered standard intraoperative management (control group) while other (Test group) Dexmedetomidine infusion was used. Demography details (age, gender, weight, ASA-PS) is shown in table 1. An informed consent was obtained from all patients. All patients underwent as thorough pre-anesthesia checkup and were posted for proposed surgery once certified fit by the Anesthesiologist. After confirming nothing by mouth status for 6 hrs, patients were shifted to operating room. An appropriately sized IV cannula was secured and essential monitoring was established (pulse oximeter probe for oxygen saturation, noninvasive blood pressure cuff and electrocardiography using lead II, V5). Standard general anesthesia technique used was 0.03 mg/kg midazolam, 1.5 µg/kg fentanyl and 2-2.5 mg/kg of propofol, all IV. In both arms of study, neuromuscular blockage was achieved using 0.1 mg of IV vecuronium and airway was secured with appropriately sized flexometallic endotracheal tube placed nasally which was confirmed using end-tidal carbon dioxide trace. Anesthesia was maintained with oxygen/medical air (fresh gas flow of 1 L) and isoflurane titrated to a MAC of 1. All

**Table 1:** Demography details, and comparison of intraoperative fentanyl consumption

| Variables | Control group | Test group | *P* value |
|---|---|---|---|
| Age (years) | 51 ± 11.17 | 50.3 ± 13.16 | 0.449 |
| Weight (kg) | 63.6 ± 10.65 | 66.4 ± 14.40 | 0.307 |
| Gender (M/F) | 9/1 | 6/4 | 0.121 |
| ASA- PS (I/II) | 4/6 | 2/8 | 0.329 |
| Intraoperative fentanyl (µg) | 200 ± 20.41 | 129.5 ± 23.14 | <0.00001* |

ASA-PS: American society of Anesthesiologists'-physical status

*- *P*-value less than 0.05 was considered statistically significant.

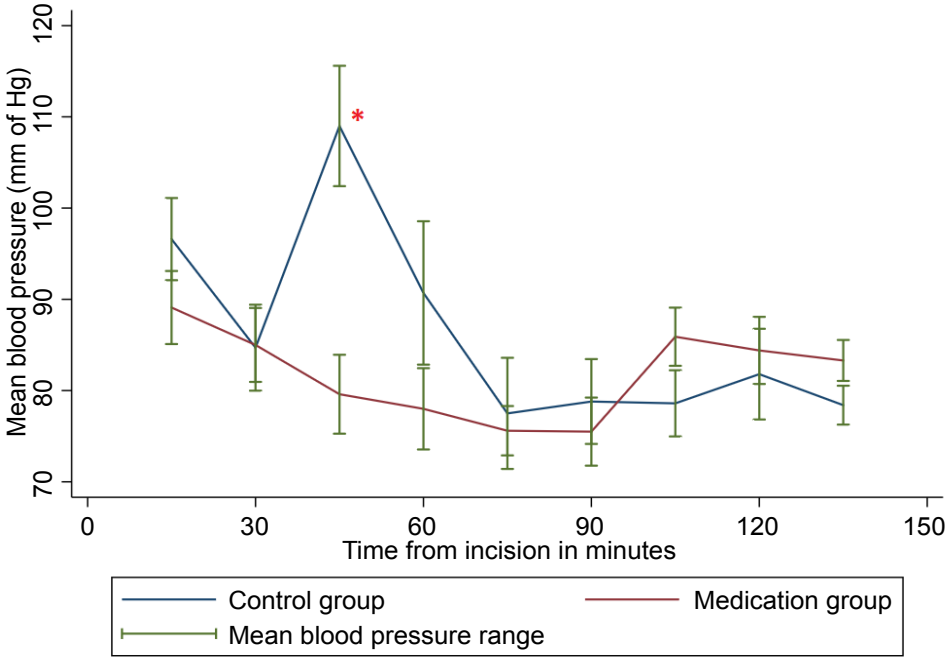


**Figure 1:** Comparison of the correlated mean blood pressure in the patients undergoing wide local excision of the tongue.
*- denotes statistical significance

patients received 0.1 mg dexamethasone after induction and 1 gm paracetamol IV during surgical closure. 10 patients received standard general anaesthetic as described below. 10 patients in test group received 1 µg/kg dexmedetomidine over 15 minutes (loading) followed by 0.5 µg/kg/hr till glossectomy was performed. In both groups, patients received another 50 µg boluses of fentanyl if hemodynamics (heart rate, systolic and mean blood pressure) increased from 20% of baseline intraoperatively.

Appropriate statistical tests were employed for analysis of data from both groups. Continuous data was expressed as mean ±standard deviation or median and interquartile range whichever was applicable and analyzed using unpaired t-test. Categorical data was expressed as absolute numbers and analyzed using Chi-Square test. p-value of less than 0.05 was considered statistically significant. Statistical analyses were executed by GraphPad Prism 5 for Windows (GraphPad Software, La Jolla, CA, USA).

Intraoperative hemodynamics and total fentanyl consumption were noted and compared in both groups. The demographic data were comparable in both groups. Hemodynamics were stable in dexmedetomidine group compared to standard group (Figure 1). There was a significantly lesser use of intraoperative fentanyl in patients who received dexmedetomidine (129.5 ±23.2 µg) than in control group (200.0 ±20.4 µg, P< 0.0001).

Intraoperative hypertensive crisis is undesirable [4]. The causes are many like inadequate analgesia, inadequate depth of anesthesia, instrumentation or handling painful structures. This crisis can have adverse perioperative outcomes leading to adverse cardiovascular and cerebrovascular events, bleeding, and increased mortality in high risk surgeries. Continuing scheduled dose of anti-hypertensives on the day of surgery is important and should be clearly mentioned in preoperative instructions [5]. Medications like diuretics, angiotensin receptor blockers and ACE-inhibitors needs to be omitted on the day of surgery but can be replaced with any calcium channel blocker. Dexmedetomidine is an alpha 2 adrenergic receptor agonist which is ten times more selective for alpha 2 receptor than clonidine [6]. Preoperative loading dose of dexmedetomidine has shown to effectively obtund intubation response and also confers intraoperative hemodynamic stability [7]. Several studies have attested the efficacy of dexmedetomidine in providing stable intraoperative hemodynamics, reduced perioperative and volatile anesthetic/ opioid use and as an adjunct to neuraxial and peripheral nerve block [8-11]. Hypotension and bradycardia after the loading dose of dexmedetomidine can be easily treated managed with co-loading of crystalloids, anticholinergics like glycopyrrolate or drugs like ephedrine or mephentermine in small aliquots.

The findings of the present study are limited by small sample size which limits a detailed statistical analysis of the available data. Still with this limited data, we could demonstrate that intraoperative hemodynamics were well maintained with lesser intraoperative fentanyl consumption in dexmedetomidine group compared to control group. Well-designed, adequately powered randomized study needs to be done to establish the role

of dexmedetomidine in attenuating hemodynamic response to glossectomy and to reduce perioperative opioid consumption.

## Conflicts of Interest

None

## Acknowledgements

None

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**Citation:** Nair A, Nemade HK, Gondi J, Rayani BK. Efficacy of Dexmedetomidine Infusion to Attenuate Hemodynamic Response and Opioid Sparing Properties During Wide Excision of Carcinoma Tongue. Transl Perioper & Pain Med 2020; 7(4):288-290



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**Additional publication details**

**Journal short name:** Transl Perioper & Pain Med

**Received Date:** June 22, 2020

**Accepted Date:** August 01, 2020

**Published Date:** August 05, 2020