

## Efficacy of lignocaine with clonidine and adrenaline in minor oral surgical procedure-Research Paper

Shahid Hassan<sup>1</sup>;Ajaz Shah<sup>2</sup>;Mohammed Israr<sup>3</sup>;ZahoorTeli<sup>4</sup>;Tajamul Hakeem<sup>5</sup>

<sup>1</sup>Lecturer, Deptt. Of OMFS, Govt Dental College, Sgr.

<sup>2</sup>Proff. & H.O.D, Deptt. Of OMFS, Govt Dental College, Sgr.

<sup>3,4,5</sup>Post Graduates

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### Abstract:

**Introduction:** Lignocaine is a commonly used local anaesthetic in dental practice. Many practitioners use adrenaline (epinephrine) as additive with lignocaine, and some have used clonidine, instead of adrenaline. Both having benefits and limitations. Use of vasoconstrictors in local anaesthesia is well known.

**Aim:** The study was done on 50 patients who underwent removal of bilateral impacted third molars. The aim of the study was to compare the efficacy of lignocaine with clonidine and lignocaine with adrenaline in respect to onset, duration of anaesthesia, and postoperative analgesia along with hemodynamic stability (systolic blood pressure, diastolic blood pressure, mean arterial pressure, heart rate in intraoral nerve block).

**Study Design /Material & Methods:** The patients were randomly selected of both sexes (male and female) between the age group of 20–45 years. Patients received 2 mL of 2% lignocaine with adrenaline (12.5 µg/mL) on one side and 2 mL of 2% lignocaine with clonidine (15 µg/mL) on the other side at two different appointments. 2 millilitres of drug was administered in both the test group and the control group.

**Conclusion:** Statistically there was significant decrease in intraoperative and postoperative systolic blood pressure, diastolic blood pressure, mean arterial pressure, and heart rate in the lignocaine with clonidine group. The efficacy of clonidine based on visual analog scale was similar to adrenaline. No significant operative complications were observed.

**Keywords:** Additives, Local anaesthesia, Vasoconstrictor, Visual analog scale,

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### I. Introduction

Lignocaine is a commonly used local anaesthetic in dental practice. Many practitioners use adrenaline as additive with lignocaine, for local infiltration and nerve blocks for intra oral anaesthesia. Changes in heart rate and blood pressure can be significant during and after extraction as the local anaesthetic solutions contain adrenaline in different concentrations [1]. Some centres have also used clonidine with lignocaine instead of adrenaline. Clonidine is  $\alpha - 2$  adrenoreceptor agonist with both central and peripheral action. It is said to decrease the blood pressure and also bring about vasoconstriction of peripheral blood vessels due to activation of postsynaptic  $\alpha - 2$  adrenoreceptors [2]. Clonidine has been used previously in few studies [1-4] along with lignocaine for intra oral anaesthesia. They have been done in ASA I and ASA II patients. In a study by Patil et al., [1] the onset of anaesthesia was the same in the groups involving both adrenaline and clonidine. Without vasoconstrictors local anesthetic agents can produce vasodilatation and increases rate of absorption of local anesthetics from injection site. Vasoconstrictors are added to local anesthesia to reduce bleeding from surgical site and to increase the duration of action of local anesthetics.

### II. Materials and Methods

After approval from Institutional ethics committee was obtained, 50 ASA I patients who reported to our Department Of Oral And Maxillofacial Surgery, Govt. Dental College, Srinagar with bilaterally impacted third molar were randomly selected of both genders (male and female) between age group of 20 and 45 years.

Surgery was performed in two different appointments.

Group 1 (test group): lignocaine with clonidine was used on one side.

Group 2 (control group): lignocaine with adrenaline was used on the other side.

An informed consent was taken before the procedure.

A 2% lignocaine with 1:80,000 adrenaline was used to make the concentration of 12.5 µg/mL. To make the concentration of lignocaine + clonidine of 15 µg/mL, 9 mL of 2% xylocaine was mixed with 1 mL ampule of 150 µg/mL of clonidine in a 10 mL syringe. From this syringe, the solution was transferred to 2 mL syringe so that each milliliter contains 15 µg/mL.

Two milliliters of solution for intraoral nerve block was injected with 2% lignocaine with adrenaline (12.5 µg/mL) on one side and 2% lignocaine with clonidine (15 µg/mL) on the other side at two different appointments. Patients were evaluated preoperatively and postoperatively for systolic blood pressure (SBP),

diastolic blood pressure (DBP), heart rate, and mean arterial pressure. The response to pressure testing and subjective signs of anesthesia determined the onset and duration of anesthesia. Postoperatively, patients were evaluated to establish the duration of analgesia.

Pain experiences were measured by Visual Analog Scale (VAS) and Verbal Rating Scale (VRS).

The inclusion criteria were ASA1 of 20–45 years with bilaterally impacted third molar. Pregnant women, known hypertensives, paediatric patients, patients with localized infection, nursing mothers and apprehensive patients were excluded from the study.

### III. Results

The results obtained in ASA1 patients demonstrate that the anesthetic solution with clonidine, as a vasoconstrictor, significantly decreases systolic blood pressure, mean arterial pressure [Figure 1], and heart rate [Figure 2]. In contrast, after the injection of lignocaine with adrenaline, increased heart rate has been observed in surgery. The cardiovascular parameters during anesthesia with clonidine containing local anesthetic solution were more stable than adrenaline group, whereas parameters of local anesthesia were similar in both the groups. Comparison of VAS between the two groups depicts the mean value was not statistically significant [Figure 3]. Mean of VRS was higher in the adrenaline group compared with the clonidine group [Figure 4]. These findings may be relevant to Oral & Maxillofacial Surgeons endeavoring to find a vasoconstrictor for local anesthetic solution with minimal cardiovascular risk. Multiple variable factors exist, such as technique variability, anatomical variations, complexity of procedure and reporting error. Pain itself is multifactorial; and perception and pain reaction vary greatly among individuals. Clonidine has shown to reduce cardiac morbidity and mortality improving perioperative outcome in patients at risk for cardiovascular events (5)

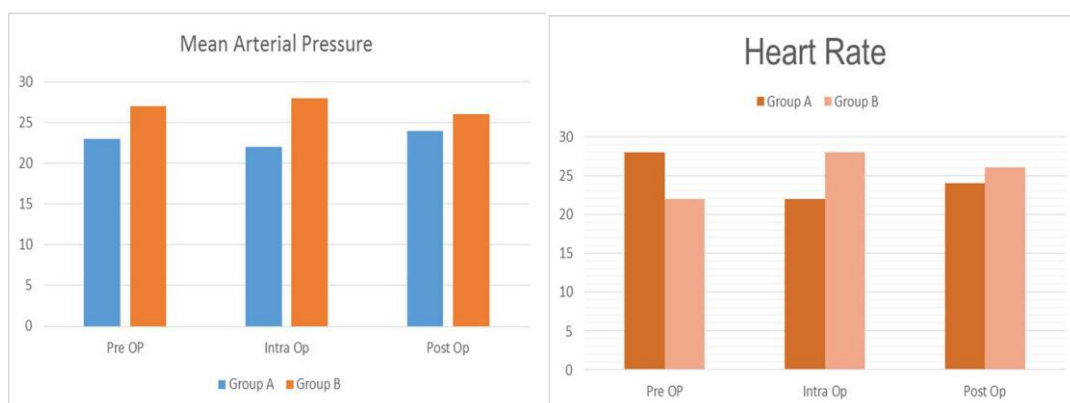


Figure 1: Mean arterial pressure in the two groups Figure 2: Comparison of heart rate

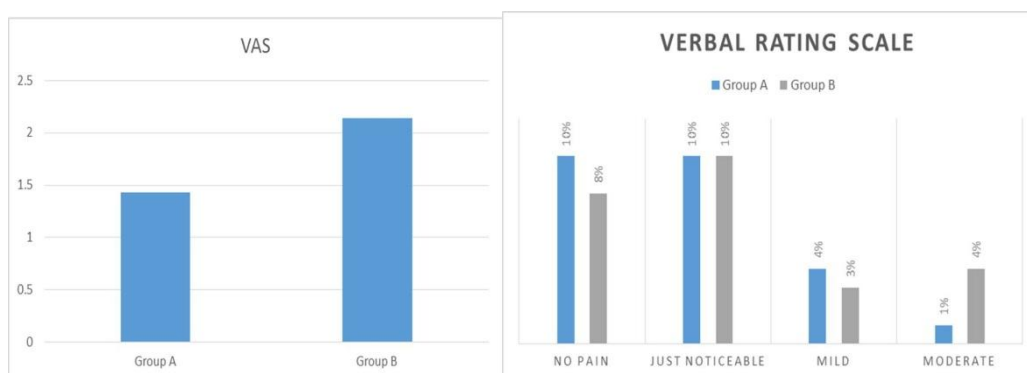


Figure 3: Comparison of visual analog scale

figure 4: Comparison of visual analog scale

#### **IV. Discussion**

Local anesthetics are used to control pain during minor oral surgery which is one of the most important factor. Lignocaine with clonidine combination could be useful and a safe alternative to lignocaine with epinephrine for intraoral anesthesia.[2] Several studies have been carried out using different concentrations of clonidine for enhancement of epidural anesthesia[6] and brachial plexus blocks.[7] These studies showed that effective concentration of clonidine without significant side effects were 150 µg/mL, 90 µg/mL<sup>3</sup>, 30 µg/mL<sup>3</sup>, 10µg/mL<sup>3</sup>, 5 µg/mL.[8]

It appears that clonidine could be a useful alternative to adrenaline for intraoral anesthesia and may have a role in those with cardiovascular disease or those particularly sensitive to adrenaline.[3]

In a study by Brkovic et al., there was no significant difference in the onset of anesthesia between the clonidine and the epinephrine groups, because the onset of anesthesia primarily depends on the characteristics of local anesthetics.[3]

In the present study, preoperatively the difference in mean SBP and DBP in the clonidine and adrenaline groups were not statistically significant. Intraoperatively, there was a significant increase in SBP and DBP in the adrenaline group compared with clonidine group. Postoperatively a higher mean SBP and DBP were seen in the adrenaline group compared with the clonidine group.

In a study by Brkovic et al.,[2] it was proved that heart rate before anesthesia administration for lidocaine with clonidine group was  $85.4 \pm 3.1$  bpm and decreased significantly 10 min after surgery ( $80.9 \pm 2.8$  bpm). In lidocaine with epinephrine group, heart rate significantly increased 10 min after surgery in comparison with the values before anesthesia. With application of lidocaine with epinephrine, increased heart rate was observed after surgery. In cardiovascular patients, clonidine in lidocaine anesthesia given for cervical plexus block produces hemodynamic stability, which was not observed in lidocaine with epinephrine-treated patients in whom significantly increased heart rate was recorded.[6] Clonidine slightly lowers heart rate. This effect was significant at 30, 60, 120, 180 min. Clonidine incrementally reduced stroke volume. As a result there was prolonged fall in cardiac output. Clonidine caused prolonged decrease in cardiac output mainly as a result of reduction of heart rate and stroke volume.[9] Clonidine decreases heart rate by increasing vagal tone and inhibiting cardioaccelerator nerve.[10]

The present study showed the difference in mean heart rate preoperatively and intraoperatively was not so significant between clonidine and adrenaline group but postoperatively significantly lower mean heart rate was seen in clonidine group compared with adrenaline group.

James Eisenach showed that there was no significant statistical difference between clonidine and adrenaline group when intensity of anesthesia was evaluated VAS and VRS. The present study shows 40% of patients in clonidine group had no pain, 43% had just noticeable, 17% had mild pain. Thirty percent of patients in adrenaline group had no pain, 43% had just noticeable pain, and 13% had mild to moderate pain. The difference in mean VAS between the two groups was not statistically significant. No significant association was observed between VRS in adrenaline and clonidine groups.

The total number of pain medication doses taken was significantly lower in clonidine-treated patients, compared with those treated with adrenaline in 24 h postoperatively. The mean duration of analgesia was more with clonidine group compared with adrenaline group indicating that clonidine increases the duration of postoperative analgesia. Shelf-life of freshly prepared lignocaine with clonidine was 8 h, whereas lignocaine with adrenaline has a proven longer shelf-life. This indicates that, freshly prepared solution of lignocaine with clonidine should be used for every procedure, which may add to the cost of treatment. Patients falling in American Society of Anesthesiologists (ASA) I category was only included in the present study. The cardiovascular soothing effect of clonidine suggests that this drug can be a safe choice to be used in patients in whom adrenaline use was to be avoided.

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### Footnotes

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**Conflict of Interest:** None declared.