

Original Research

Heamodynamic Stability in old age patients pre and post dental extraction procedure- An Original Research

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ABSTRACT:

Aim: The purpose of this study was to assess various hemodynamic stability parameters in elderly patients pre and post dental extraction. **Methodology:** 100 middle aged patients between 35 to 45 years of age undergoing routine dental extractions were selected. Pre-operative, During Local Anaesthetic (LA) administrations, Intra-operative and Post-operative measurements were taken. Pulse oximeter was used to measure Pulse rate, Blood Pressure, Heart rate and Oxygen saturation level. **Results:** Minor changes were observed in measurements of heart rate, blood pressure especially systolic blood pressure, oxygen saturation and pulse rate. However, variations were not significant enough. **Conclusion:** Dental surgeons must be able to identify medical emergencies and adopt the opportune measures to avoid them or treat them quickly and effectively. The observed hemodynamic changes are possibly due to other factors such as stress and patient's anxiety and not necessarily due to anaesthetics.

Keywords Geriatric, Hemodynamics, Local Anaesthetic, Dental Extraction.

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INTRODUCTION

Safe and effective control of intraoperative pain is an intrinsic and important part of clinical dental practice. This is commonly achieved with the use of local anaesthetics, which are pharmacological agents that cause reversible interruption in the conduction of a nerve impulse to an anatomic part of the body. The successful provision of many dental treatments including tooth extraction, therefore, depends on achieving excellent perioperative local anaesthesia. The vasoconstrictors and local anaesthetics commonly used in oral surgery can induce hemodynamic changes

during tooth extraction in the same way as other factors such as patient anxiety or stress. The adrenaline added to the anaesthetic solution is used in oral surgery to increase the potency and duration of anaesthesia, reduce the plasma concentrations of the anaesthetic, and improve the local control of bleeding. Adrenaline containing local anaesthetic has been criticized due to the risk of possible massive systemic absorption of the drug, resulting in undesirable cardiovascular effects. This risk is more likely in patients with cardiovascular disease and hypertension; an increase in blood pressure (BP) has also been

reported after the injection of anaesthetics even in normotensive patients. It is also widely claimed that the use of local anaesthetics with adrenaline predisposes to undesirable cardiovascular changes that may result in life-threatening medical complications, representing a risk to patients with heart disease, especially those previously undiagnosed.¹

The incidence of oral diseases increases with age in the elderly. Oral health is more important for elderly patients who have high risk for oral diseases, age-related diseases, or chronic diseases, or who require multidrug treatment. In the past 5 decades, utilization of dental care and dental equipment has increased in the elderly. During the same period, the oral health and use of dental services among older adults in the United States have improved.²

Chinese statistics shows 43.7% of the elderly population has hypertension (HBP) or cardiac-cerebral vascular disease (CCVD).³ Some chronic diseases may promote the occurrence of oral diseases and compromise the effectiveness of oral care.⁴ In recent years, the elderly are paying more attention to their oral health. Oral surgery – especially tooth extraction – is also increasingly common in the elderly with cardiovascular diseases. Thus, smoothly performing tooth extraction while limiting cardiovascular stress to within a safe range during tooth extraction is still a challenge in elderly patients with cardiovascular diseases. Properly managing tooth extraction in these patients with chronic diseases is crucial for their health and quality of life. Dental teams are amenable to understanding the expansion of requirement for oral care in the elderly and emphasize the education, research, and health management in this population.⁵ For years, dentists have noticed that certain characteristics are common to patients with periodontitis and patients with cardiovascular disease. Both cardiovascular disease and periodontal disease are more likely to occur in people who are older, in men, in people of lower educational status with fewer financial resources, in those who smoke, in people who have stress and in those who are socially isolated.⁶ The classical risk factors for cardiovascular disease—hypertension, hyper-cholesterolemia and cigarette smoking—account for only about one-half to two-thirds of all cases of the disease. Research has shown that atherosclerosis is more common in patients with periodontitis.⁷ This suggests that periodontal disease and cardiovascular disease may have similar causative pathways. Some scientific studies have shown a link between infections of the mouth and coronary artery disease. In one such study, Mattila and colleagues⁴ compared patients who had experienced a myocardial infarction, or MI, with healthy control subjects. They found that after adjusting for age, socioeconomic status, smoking, serum lipid levels and diabetes, dental health (as measured by the Total Dental Index) was worse in subjects who had experienced an MI. In another study

by Mattila and colleagues, a statistically significant association was found between dental infections and atheromatosis.⁸

The use of vasoconstrictors in dental practice is still an issue of high controversy because many dentists state that the use of substances such as adrenaline and noradrenaline cause significant hemodynamic changes, especially to blood pressure. In fact, the use of adrenaline in local anesthetics bears the risk of systemic absorption when used in large amounts, resulting in undesirable cardiovascular effects that can alter patients' hemodynamics.⁹

On the other hand, several studies show that the quantity of vasoconstrictors present in the local anesthetic is insufficient to cause any significant alteration. Mepivacaine and Articaine, when associated with adrenaline 1:100,000 or 1:200,000 and administered in therapeutic doses, often do not promote major changes to blood pressure, heart rate, respiratory rate and oxygen saturation. Absorption of adrenaline into the bloodstream results in some cardiac hemodynamic change related to both heart rate and blood pressure. Despite these changes, in healthy patients, it is not enough to exhibit a clinically significant effect.¹⁰

AIM OF THE STUDY

The purpose of this study was to assess various hemodynamic stability parameters like- pulse rate, blood pressure, heart rate and oxygen saturation level in elderly patients pre and post dental extraction.

METHODOLOGY

100 middle aged Patients between 35 to 45 years of age undergoing routine dental extractions in 5 private clinics from January 2019 to December 2019 were selected. All patients had no medical History. Pre-operative, During LA administrations, Intra-operative and Post-operative measurements were taken. Pulse oximeter was used to measure Pulse rate, Blood Pressure, Heart rate and SpO₂.

RESULTS

In the present study, it was noticed that there was a slight increase (70-112) in pulse rate observed in the patients, with noticeable difference between pre- and post-operative period of undergoing dental extraction. (Table 1) However, mean remained almost the similar in all cases with minor changes.

As for the measured blood pressure of the patients enrolled in the study, it was evident that more changes were seen in systolic blood pressure with a slight decrease in the mean value from 126mm Hg to 122 mm Hg. (Table 2)

The heart rate appeared to have increased if the highest value was considered from 112-114. However, the mean values remained similar with no significant changes.

Table 1- Pulse Rate of the patients enrolled in the study.

S.No.	Pre-operative	During LA	Intra-operative	Post-operative
Lowest	68	64	68	70
Mean	76	78	78	74
Highest	104	110	118	112

Table 2- Blood Pressure of the patients enrolled in the study.

S.No.	Pre-operative	During LA	Intra-operative	Post-operative
Lowest	100/60	100/60	110/64	102/60
Mean	126/78	124/76	124/74	122/78
Highest	164/102	166/102	162/100	166/102

Table 3- Heart Rate of the patients enrolled in the study.

S.No.	Pre-operative	During LA	Intra-operative	Post-operative
Lowest	62	66	68	70
Mean	78	78	76	76
Highest	112	118	120	114

Table 4- SpO₂ level measured in patients enrolled in the study.

S.No.	Pre-operative	During LA	Intra-operative	Post-operative
Lowest	94	94	93	95
Mean	98	97	98	98
Highest	100	100	100	100

The former changes might have been attributed to other factors like anxiety and fear of the dental procedures. (Table 3)

In consideration of oxygen saturation level, not much of variation was observed. Slight decrease was observed during the administration of local anesthetic and during extraction procedure. However, mean change was negligible (98%). (Table 4)

DISCUSSION

The basic monitoring of vital signs is commonly used in the practice of ambulatory care. Its use allows to obtain important information about the patient's current state, such as blood pressure, heart rate, oxygen saturation and respiratory rate. These signs can be obtained in a non-invasive way through easily manipulated devices, sphygmomanometer and pulse oximeter. This practice has been increasingly used because of the growing number of high-risk patients in oral surgeries¹, mainly because many of them come to the clinic to undergo dental treatments without knowing if they have any type of systemic problem. The identification and control of these physiological indicators are some of the factors responsible for the promotion of successful treatments, avoiding emergencies that expose the patient to risky situations². Therefore, monitoring has three major advantages: the ability to detect, evaluate and prevent emergencies in clinical practice.⁹

The substances used in anesthesia are not the only ones capable of promoting hemodynamic changes. Factors inherent to the patient can also trigger fear and decrease the pain threshold.¹¹

Since the patient is frequently in a state of anxiety and fear during the procedure, these emotional issues can imply changes to vital signs and in turn cause transoperative and postoperative complications. In 2001, Malamed described that the stress to the patient caused by minor oral surgeries causes endogenous catecholamines (adrenaline and noradrenaline) to be released from their original site in an amount 40 times greater than the adrenaline present in the local anesthetic tube. Chaia et al. analyzed that the expectation and fear can promote changes to blood pressure and cause tachycardia.¹²

In the study done by Meechan et al, the fall in DBP was seen at 20 minutes in a higher concentration of adrenaline and at 30 minutes in local anaesthetics with 1:2,00,000 adrenaline.¹³ Meral et al. compared the oxygen saturation in patients with different levels of anxiety and noticed no significant changes in oxygen saturation even with increase in the SBP and DBP. They concluded that there is no significant co-relation between oxygen saturation and anxiety.¹⁴

CONCLUSION

Dental surgeons must be able to identify medical emergencies and adopt the opportune measures to avoid them or treat them quickly and effectively. The observed hemodynamic changes are possibly due to other factors such as stress and patient's anxiety and not necessarily due to anaesthetics. Further studies to ascertain the role of these factors in hemodynamic changes during oral surgery procedures may be necessary.

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