EFFECTS OF DENTAL LOCAL ANAESTHESIA IN CARDIAC PATIENTS – A REVIEW

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ABSTRACT

AIM: To emphasise the recent updates on effects of dental local anaesthesia in cardiac patients.
OBJECTIVE: The objective of this review is to summarize the current knowledge regarding effects of dental local anaesthesia in cardiac patients.
BACKGROUND: Local anaesthetic agents themselves can affect the cardiovascular system, especially at higher doses. Cardiovascular manifestations are usually depressant and are characterized by bradycardia, hypotension, and cardiovascular collapse, potentially leading to cardiac arrest. The initial signs and symptoms of depressed cardiovascular function commonly result from vasovagal reactions like fainting and dizziness particularly if the patient is in an upright position.
REASON: There always complications and risk of using dental local anaesthesia with varying components and composition on cardiac patients. So it is always best for the dentist to examine the patient's history and proceed with the dental treatment.

KEYWORDS: Bradycardia, Cardiovascular disease, Local anaesthesia.

INTRODUCTION

One of the important problem in medicine is pain management .The of the most important aspect in dental medicine is pain alleviation. Many studies are carried on dental anaesthesiology which leads to production of number of new agents of local anaesthesia. As most of procedures in dental medicine are painful, pain management is necessary. Various studies in the field of dental anaesthesia resulted in the development of new agents for local anaesthesia and new methods for pain management. The aim of this article is to present the results of the recent studies on the effect of the dental local anaesthetics on patients with cardiovascular diseases. [1] Adrenaline is one of the important component dental anaesthesia which causes many cardiovascular diseases like angina, arrhythmias, hypertension, pallor, palpitations, tachyarrhythmia, tachycardia, vasoconstriction, and ventricular ectopy. It also increases the heart rate and blood pressure.

Based on the adverse effect of anaesthetic substances on the blood pressure and cardiac rhythm the usage of local anaesthesia differs and there always fear of complications. Local anaesthetics can act directly on the smooth or cardiac muscle or by action on the autonomic innervation of the heart to produce hemodynamic effect. All of them cause complications, bases on the concentration, an increase in heart rate and mean arterial blood pressure (MBP). When the anaesthetic dose causes cardiovascular collapse, the predominant effect is tachycardia, however, the occurrence of most adverse reactions is due to inappropriate high-dose injections and accidental intravascular punctures. Other than allergic reactions, the anaesthetic complications are caused by a higher adrenergic stimulation on the cardiovascular system[2].

EFFECTS OF ADRENALINE ON CARDIAC PATIENTS

The physiologic effects of adrenaline are numerous, as it is responsible for the "fight or flight" which is a physiological reaction that occurs in response to a perceived harmful event, attack, or threat to survival in humans. There is variations in response of the body which depends on number and predominant type of adrenergic receptors present in the target organ and on the physiologic reflex response that attempts to minimize the effects of sympathetic stimulation.
In addition to anaesthetic, has adrenaline effect on heart rate, stroke volume, cardiac output, heart rhythm, myocardial oxygen. Adrenaline's effect on blood pressure depends on the dose and route of administration. Small doses or doses administered subcutaneously may result in little or no change in blood pressure. This is often due to the combination of a slight elevation in systolic pressure and a lowering of diastolic pressure, resulting in little change in mean arterial pressure.
Ultimately the cardiac output will be increased since the adrenaline increases heart tare and force of ventricular contraction. The elevation in cardiac workload increases myocardial oxygen consumption. This is a concern in an individual suffering from cardiac disease, particularly given that the beneficial coronary vasodilatory effect of adrenaline is diminished or absent in the presence of coronary vessel atherosclerosis. Thus, the careless use of epinephrine can be harmful to a patient with cardiac disease. [3, 4, 5]

EFFECT OF DENTAL LOCAL ANAESTHESIA ON CARDIAC TRANSPLANT PATIENTS

Transplanted hearts are supersensitive to the effects of circulating catecholamines. There haemodynamic effects of dental local anaesthetics containing adrenaline in patients with cardiac transplants and adrenaline in dental local anaesthetics did not affect blood pressure in cardiac transplant recipients. Adrenaline contained in dental local anaesthetics significantly increased heart rate in cardiac transplant recipients before periodontal surgery. Since the surgery did not cover the haemodynamic changes produced by the local anaesthetic in cardiac transplant recipients, adrenaline-free solutions may be preferred for dental local anaesthesia in cardiac transplant recipients during dental treatments.[6]

CARDIOVASCULAR EFFECTS OF LOCAL ANESTHESIA WITH VASOCONSTRICTOR DURING DENTAL EXTRACTION IN CORONARY PATIENTS

The dental surgeons routinely treat cardiac patients , when requiring dental extraction, who are brought to cardiologist's, the treatment is be performed under local anaesthesia without vasoconstrictors, particularly epinephrine and norepinephrine. In this clinical situation, dental professionals face a difficulty, if they do not follow the medical recommendation, they will be taking the probable risks that anaesthetic solutions with vasoconstrictors may occasionally pose to ischemic heart disease patients and if this type of anaesthetics is not used, the procedure will occur with more severe hemorrhage and less deep analgesia of shorter duration[7].

EFFECTS OF ADRENALINE IN LOCAL DENTAL ANESTHESIA IN PATIENTS WITH CORONARY ARTERY DISEASE

A research which was done by Ricardo SimõesNeves with Sixty-two patients ages ranging from 39 to 80 , 51 of whom were male. Thirty patients were randomly assigned to receive 2% lidocaine with epinephrine (epinephrine group), and the remaining patients, 2% lidocaine without epinephrine (non-epinephrine group) for local anaesthesia to find the effect of adrenaline in local dental anaesthesia in patients with coronary artery disease.
From this research it was found that no difference was observed in blood pressure, heart rate, or evidence of ischemia and arrhythmias in either group. The use of vasoconstrictor has proved to be safe within the range of the present study.
The blood pressure did not behave differently with epinephrine-containing and epinephrine-free anaesthetic solution. Heart rate did not change during the procedure, nor was there evidence of myocardial ischemia and cardiac arrhythmia, using anaesthetic solution with and without vasoconstrictor, in patients taking drugs, the majority of whom were on beta-blockers.[8]

EFFECT OF LOCAL ANESTHETICS WITH AND WITHOUT VASOCONSTRICTOR AGENT IN PATIENTS WITH VENTRICULAR ARRHYTHMIAS

In a research which was carried out by Maria Teresa FernándezCáceres et al it is found that The effects of then dental local anesthetics, with or without non-adrenergic vasoconstrictors, on the cardiovascular system are not significant, in spite of the known variability in the behaviour of ventricular arrhythmias at 24-hour Holter monitoring, no significant alterations in their number or complexity pattern were observed, after anesthetic interventions and throughout the procedure.
The use of anesthetics with non-adrenergic vasoconstrictors at adequate doses can be safely used in Chagas'ic and coronary patients with complex ventricular arrhythmia.[2]

CONTRADICTIONS TO VASOCONSTRICTORS IN DENTAL ANESTHESIA IN CARDIAC PATIENTS

The absolute and relative contraindications to the use of vasoconstrictors in dentistry depend on the potential risk of cardiovascular and metabolic complications after their use in medically compromised patients. In that regard the dental literature has focused primarily on cardiovascular diseases, and as dentists we have been prompted to be cautious with their use mainly when dealing with cardiac patients.

The risks of serious medical complications after the injection of local anaesthetics with vasoconstrictor or after the use of epinephrine-impregnated retraction cords are not exclusive to patients with severe cardiovascular diseases. There are other instances where dentists should be as concerned and avoid the use of vasoconstrictor. Undoubtedly these substances can be used safely in dentistry in most medically compromised patients, but the possibility of an intravascular injection makes the risk far greater than the benefit of deep anaesthesia in patients with uncontrolled or non-medically treated hyperthyroidism, labile or unstable diabetes, steroid-dependent asthma, sulfite allergy, or pheochromocytoma. We should also stress the impression of false security surrounding the intraligamentary injection and the use of impregnated retraction cord on the account of the small quantities of vasoconstrictor. It is now well documented that these techniques lead to immediate systemic repercussion and are equivalent to an intravascular injection of vasoconstrictor. To minimize the risk and prevent serious complication, a thorough medical history is mandatory for every dental patient. Only then will dentists be able to rationally to use vasoconstrictor in medically compromised patients. [9]

CONCLUSION

A history is crucial in determining which cardiac patients are at particular risk during a dental procedure. Patients with unstable coronary syndrome (unstable angina, recent myocardial infarction [MI]), decompensated heart failure, significant dysrhythmia or severe valvular disease seem to be at particular risk from the effects of epinephrine. For these patients, elective dental treatment should be postponed until their cardiac status has been medically or surgically optimized. For patients determined to be medically capable of undergoing general dentistry, pain control is essential, particularly in those with cardiac disease. Pain and other stressors can result in a dramatic endogenous release of epinephrine and norepinephrine, which can affect the diseased heart deleteriously. Whatsoever to minimize the risk and prevent serious complication, a thorough medical history is mandatory for every dental patient. Only then will dentists be able to rationally to use dental local anaesthesia in medically compromised patients.

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