



## Dental Approach to the Hypertensive Patient: Literature Review

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### Abstract

Hypertensive patients deserve special attention, due to possible complications which may occur during invasive dental care. This manuscript has aimed at reviewing the literature regarding the following: a safe dental approach to hypertensive patients, local anesthetics indication, surgical risks, hypertensive crisis, drug interactions, and oral manifestations of antihypertensive drug use. The present study was developed by research in

the following databases: Virtual Health Library (VHL) – Bireme, MEDLINE, PubMed, SciELO, and the Capes database Journals. For a safe approach to the hypertensive patient, some precautions must be taken and respected, as follows: adequate anamnesis is crucial to evaluate other associated systemic alterations (cardiovascular, diabetes, renal failure), measure blood pressure at the beginning, and, in case of longer procedures, monitor blood pressure during the intervention, minimize chair time for the sake of the patient's anxiety. Medication regarding stress reduction control can be used to prevent high blood pressure from emotional conditions as well as choosing the appropriate anesthetic. Solutions with vasoconstrictor lower concentration, respecting the dose, and following the principles of the anesthetic technique must be observed. Non-steroidal anti-inflammatory drug use should be avoided. These precautions will avoid serious iatrogenic events in addition to promoting and guaranteeing patient safety and quality care.

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**Keywords:** Oral Health, Dentistry, Hypertension, Care

## Introduction

Systemic arterial hypertension (SAH) is a multifactorial clinical condition characterized by a sustained increase in blood pressure levels  $\geq 140$  and/or  $90$  mmHg. It has often been associated with metabolic disorders, functional and/or structural changes in target organs, being aggravated by the presence of other risk factors (RF), such as dyslipidemia, abdominal obesity, and diabetes mellitus (Brazilian Society of Cardiology, 2016).

SAH can be primary or idiopathic or even secondary to another disease. Approximately 90% of hypertensive patients are considered to have primary hypertension, which means that the causes are unknown (Rosário et al., 2009); in only 10% of cases, the hypertension is secondary. A great number of risk factors involving: age, gender and ethnicity, overweight and obesity, alcohol and salt intake, smoking, stress, physical inactivity, use of oral contraceptives, environmental factors, and socioeconomic and genetic factors should be considered (Braga et al., 2018; Brazilian Ministry of Health, 2015).

As a result of the different dental care protocols and the various ways of dealing with the hypertensive patient, this study aimed at reviewing the literature concerning the hypertensive patient's safe dental approach such as an indication of local anesthetics, surgical risks, hypertensive crisis, drug interactions and oral manifestations of the antihypertensive drugs use.

## Methodology

The present study was developed through bibliographic research obtained from the following databases: Virtual Health Library (VHL), PubMed, and the Capes database Journals. The use of descriptors included: Oral Health, Dentistry, Hypertension, and Care. The article selection criteria were determined according to the objective of the present study. Research that addressed themes inherent to Medicine, systemic condition, Dentistry, and oral health was reviewed.

## Background

Blood pressure is considered normal when measurements are less than or equal to 120/80 in the office or at home. Prehypertension is characterized by the presence of systolic blood pressure between 121 and 139 and/or diastolic blood pressure between 81 and 89 mmHg (Table 1). And these are more likely to become hypertensive, requiring periodic monitoring (Brazilian Society of Cardiology, 2016)..

**Table 1:** BP classification according to casual or in-office measurement from 18 years of age

Classification	SBP (mm Hg)	DBP (mm Hg)
Normal	$\leq 120$	$\leq 80$
Prehypertension	121 - 139	81 - 89
stage 1 hypertension	140 - 159	90 - 99
stage 2 hypertension	160 - 179	100 - 109
stage 3 hypertension	$\geq 180$	$\geq 110$

*When Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) fall into different categories, the higher one should be used for BP classification. Isolated systolic hypertension is considered if SBP  $\geq 140$  mmHg and DBP  $< 90$  mmHg, and it should be classified in stages 1, 2, and 3. ( Source: 7th Brazilian Guideline on arterial hypertension, 2016 ).*

With the increasing demand for dental treatments, dental surgeons' insecurity while dealing with emergencies becomes visible, which may be a consequence of inadequate preparation during graduation and lack of training in the profession (Araújo et al., 2013; Lúcio &Barreto, 2012)

## Local Anesthetics

Such as lidocaine, prilocaine, mepivacaine, bupivacaine, and articaine<sup>15,13</sup> are the injectable drugs most used by dentists (Carvalho et al., 2013), which makes the treatment of hypertensive patients difficult, due to the fear that local anesthetics containing vasoconstrictors cause changes in blood pressure, inducing an increase in its levels (Almeida, 2014).

Vasoconstrictors are important components of anesthetic solutions and bring advantages that allow the use of smaller amounts of solution, as it promotes a slow absorption of the anesthetic salt, reducing toxicity as well as

increasing the anesthesia effect and duration (Bronzo et al.,2012). Several disadvantages have been attributed to vasoconstrictors, however, they are functions of incorrect use, such as intravascular injections, high concentrations, rapid applications, and large volumes. The most common vasoconstrictor substances are adrenaline/ epinephrine, noradrenaline/norepinephrine, phenylephrine, and octapressin / felypressin. Noradrenaline increases systolic and diastolic pressures, with greater vasoconstriction and consequently greater tissue damage (Paiva & Cavalcanti, 2005). And felypressin, a synthetic analog of vasopressin, which in small amounts, as in local anesthesia, acts on the venous circulation and presents no cardiovascular effects, nor causes cardiac arrhythmias (Oliveira et al., 2010).

Therefore, anesthetics with vasoconstrictors can be used in patients with controlled blood pressure or under medical treatment and monitoring, as long as the maximum dosage of two tubes per session is respected, following the principles of local anesthetic technique with previous aspiration and slow injection (Bronzo et al.,2012).

When there is a great contraindication to the use of vasoconstrictors, anesthetic solutions based on 3% mepivacaine without a vasoconstrictor are chosen. The contraindication to the use of adrenaline/epinephrine is in hypertensive patients where systolic BP > 160 mmHg or diastolic > 100 mmHg). The anesthetic solution with adrenaline/ epinephrine vasoconstrictor is better at concentrations of 1:200,000 or 1:100,000; literature states that the preference is for solutions with a lower concentration of vasoconstrictor (Soares et al., 2006; Nascimento et al.,2011).

It should be remembered that once the pain is a stressful feature for the body, the endogenous secretion of catecholamines (adrenaline/ epinephrine and noradrenaline/ norepinephrine ) by the adrenals increases up to 40 times compared to baseline levels with the individual at rest, and reaches much higher blood levels compared to those obtained after application of a tube of an anesthetic solution containing adrenaline<sup>5,11,14,20</sup>. The objective in the dental care of patients with AH is to reduce the endogenous release of catecholamines that raises blood pressure quickly or suddenly (Costa et al.,2013).

## Surgery

The preoperative preparation is essential for the success of any surgical procedure therefore the hypertensive patient must be thoroughly evaluated in the preoperative period, through a careful and detailed anamnesis in the first consultation (Esteves et al.,2011). The antihypertensive medication should be evaluated, bearing in mind that most hypertensive patients receive treatment with medication and that the

medication combination is currently the most common, at least two measurements taken during the consultation should be performed with an interval of 5 minutes between them (Gealh & Franco, 2006). It is essential to update the information every six months, or whenever the patient stops going to the office for a certain period. When starting a dental treatment, the dentist must determine if the patient is fit for a safe planned dental procedure (Almeida, 2014).

Dental management is differentiated for each stage of hypertension, and patients with stage 3 hypertension should be referred to the doctor immediately and no dental treatment should be performed. Stage 1 and 2 patients can receive non-surgical dental treatments. The patient's risk classification for surgery is classified as high, intermediate, and low. Surgical procedures such as minor oral surgery, non-surgical dental procedures, and periodontal surgery are classified as low risk (Ferraz et al., 2017).

In the case of dental surgery under local anesthesia, it is not always possible to control blood loss, however, care must be taken when planning an invasive surgery for a hypertensive patient, especially if the patient is using anticoagulants or antiplatelet agents, such as aspirin or warfarin (Rodrigues et al., 2015). In these cases local hemostatic methods should be used to control hemorrhage, using a minimally invasive surgical technique, local compression with gauze, mass suture, fibrin sponge cellulose, and antifibrinolytics (antifibrinolytics 2013).

After the surgical procedures are completed, the patient must remain under observation by the professional for the first 30 minutes, or until his complete physical and emotional recovery, always monitoring his vital signs. Analgesics for pain control and antibiotics should be prescribed if necessary, according to the procedure. It is important to advise the patient about the need for the correct use of the prescribed drugs, all the surgical wound care, and the need for rest and physical efforts (Esteves et al., 2011).

Elevated BP during surgery leads to increased intraoperative bleeding, although bleeding may not be important for restorative procedures such as oral surgery, or tooth extractions. Oral and maxillofacial surgeons ask anesthesiologists to reduce BP in procedures that usually cause major bleeding, such as an osteotomy (Carvalho et al., 2013).

## Hypertensive Crisis

A hypertensive crisis results from a sudden and intense increase in blood pressure, in which very high blood pressure levels are observed at 29 ( $\geq 180 \times 120$  mmHg). Accompanied by signs and symptoms such as feeling unwell, dizziness, breath shortness, visual changes, severe headache,

coughing, chest pain, and vasospasm (Levasseur et al., 2013; Pegoraro & Oliveira, 2015)

Hypertensive crisis may represent an emergency or clinical urgency. In a hypertensive emergency, it is possible to observe signs that indicate damage to target organs, such as stroke, acute pulmonary edema, and myocardial infarction. In these cases, there is an imminent risk to life (Southerland et al., 2016). Another fact that frequently occurs during consultations is the so-called hypertensive pseudocyesis where the elevation of blood pressure is single and exclusively a response to physical or psychological stress (Feitosa-Filho et al., 2008).

In their clinical routine, the dental surgeon is subject to encountering this event once dental care is constantly related to fear, generating stress and anxiety, releasing endogenous catecholamines (epinephrine and norepinephrine) which are responsible for the significant increase in blood pressure (Martin et al., 2004; Santos & Rumel, 2006).

Therefore, the dental surgeon should be able to minimize the chances of a crisis, performing anamnesis properly, as a prophylactic measure, measuring blood pressure routinely, considering that some patients are not aware of their condition, and carrying out consultations with short sessions preferably in the morning (Nascimento et al., 2011), controlling pain, performing verbal stress control, talking to the patient, and if necessary using anxiolytics.

When the patient presents any signs that characterize a hypertensive urgency, the care must be interrupted, and he must be placed in a comfortable position, monitored and reassured and the patient must be referred for urgent medical assistance, as soon as possible (Pegoraro & Oliveira, 2015).

## Drug Interactions

Drug interaction is defined as a change in the expected pharmacological effect, due to the presence of another drug, food, drink, or chemical agent. A survey has shown that only 3% of professionals are aware of the possibility of drug interaction, even though drug prescription is an important aspect in the approach of hypertensive patients [36]. Knowledge of possible drug interactions and complications is essential, as well as the ability to propose therapeutic alternatives (Cruz et al., 2017). It is the responsibility and obligation of the dental surgeon, as a prescriber, to have extensive knowledge of pharmacology, dosage, mechanism of action, indication, and side effects that may occur as a result of the use of the drug in dental practice (Cruz et al., 2017).

Analgesics aim to control low-intensity acute pain, with paracetamol and dipyrone and they are the most used in Dentistry. Regarding the use of

ASA, there are restrictions, despite having good analgesic activity, for patients using antihypertensive drugs from the ACE inhibitor group (angiotensin-converting enzyme - example: Captopril), due to its anti-aggregating action. platelet (Nascimento et al., 2011; Cruz et al., 2017).

Non-steroidal anti-inflammatory drugs ( NSAIDs ) are used to prevent hyperalgesia and control edema resulting from dental interventions. The most used in Dentistry are Ibuprofen and Nimesulide. However, they are contraindicated, as they cause a decrease in the synthesis of prostaglandins, essential in the metabolism of hypertensive agents, causing sodium retention and an increase in the volume of intravascular fluid, resulting in an increase in blood pressure (Popescu et al 2013; Carvalho et al.,2010). They can also reduce the antihypertensive action of beta-blockers (propanol) and angiotensin-converting enzyme inhibitors (captopril) and diuretics (furosemide) (Costa et al.,2013).

Diuretic antihypertensive agents (furosemide, spironolactone, hydrochlorothiazide, etc ), beta-blockers ( atenolol, propranolol, etc ), alpha-blockers ( prazosin, terazosin, alfuzosin, doxazosin, etc ) and Angiotensin Converting Enzyme – ACE inhibitors (captopril, enalapril, lisinopril, etc ) are the most affected by the action of NSAIDs. When moderate to severe pain is expected, analgesics such as paracetamol or dipyrone can be prescribed. In any case, it is necessary to discuss the case with the patient's cardiologist (Costa et al.,2013).

Antibiotics are used in Dentistry to treat acute or chronic ontogenic and non-ontogenic infections. Amoxicillin, Azithromycin, which causes an increase in the concentration of carbamazepine, cyclosporine, phenytoin, digoxin and triazolam, and Metronidazole, is the most commonly used in Dentistry, and antibiotics generally do not present drug interactions with antihypertensives (Cruz et al., 2017).

## Oral Manifestations

Many of the oral manifestations in hypertensive patients are side effects caused by the antihypertensive drugs themselves such as lichenoid reactions, gingival hyperplasia which can lead to difficulty in oral hygiene, difficulty in chewing, alteration in the process of tooth eruption, interference with speech and aesthetic impairment, increased risk of gingival bleeding and oral infections. Gingival hyperplasia can be caused by most calcium channel blockers (BCA), with an incidence of 1.7% to 3.8, mainly nifedipine (Fróis, 2014). As a treatment, periodontal surgical intervention is indicated, however not definitive, since the patient will continue to use the medication. The most effective way would be for the drug to have its dose reduced, or to be replaced by another drug of a different class, as long as it is feasible (Almeida, 2014).

Xerostomia is another common adverse effect of virtually all antihypertensive drugs, with patients taking more than one drug being most affected. Changing medication rarely helps, most can produce dry mouth (Fróis, 2014), and xerostomia can result in several side effects such as increased incidence of caries poor denture fitting, taste alteration burning sensation /burning mouth, difficulty in chewing, swallowing, talking and candidiasis(Popescu et al 2013). As a way of mitigating the effects, the use of artificial saliva can be prescribed, according to the patient's need. It is also possible to prescribe pilocarpine, 5 to 10 mg, 15 to 30 minutes before meals (Costa et al.,2013)...it is also very important to advise the patient to drink water more frequently, or to use sugar-free gum to stimulate saliva production, as well as avoid the use of mouthwashes with alcohol, as these increase the sensation of dry mouth and burning mouth(Costa et al.,2013)..

Lichenoid drug reaction is clinically indistinguishable from lichen planus, it occurs with some antihypertensive drugs. Changing medication may help, however, a lesion biopsy should be performed if there is regression. Treatment of the lichenoid lesion is only necessary if the patient is symptomatic (Popescu et al 2013; Carvalho et al.,2010). .

## Discussion

There is no consensus among the authors on which blood pressure level and the intervention limit, however what is agreed among authors is that blood pressure controlled or situated in the limits of up to 150/90 mmHg, measured on the day of the consultation, the Hypertensive patients may undergo elective or urgent dental procedures, nonetheless, the existence of other associated systemic alterations such as cardiovascular disease, diabetes, and renal failure should be assessed (Nascimento et al., 2011).

Studies by Costa et al.,(2013), Oliveira et al., (2010), and Carvalho et al.,(2013) are in favor of the use of vasoconstrictors, without fear of compromising or harming the patient, as long as the maximum dosage of 2 tubes according to Costa et al.,(2013) and Carvalho et al.,(2013), and up to 3 tubes according to Oliveira et al.(2010) have explained that the amount of epinephrine released as a result of stress is much greater than the content of an anesthetic tube. Articles reporting the conduct of the dental surgeon about surgeries in hypertensive patients were evaluated. From the relevant literature review, it was possible to identify that every dental surgeon, before starting any dental treatment, must determine if the patient will undergo the procedure with complete safety, through a very detailed anamnesis and always obtain updated information from the same.

This shows the importance of the dentist to analyze the blood pressure levels of their patients and to have knowledge about their clinical condition, thus being able to control the patient's risk classification.

According to Nascimento et al., (2011), high blood pressure during surgery leads to increased intraoperative bleeding. If you are going to perform surgery in the office under local anesthesia, you should be careful with the hypertensive patient, especially if he is taking anticoagulants or antiplatelet agents. The ideal approach for these patients, especially if BP is elevated, is to check anticoagulation before proceeding with the surgical procedure.

For patients who present BP above 140/90mm/Hg, intervention should not be performed, once hypertension is detected, interaction with other professionals such as the cardiologist is recommended, avoiding possible intercurrences. In patients who are apprehensive during the procedure, it is important to control anxiety with pharmacological and non-pharmacological methods, whether or not related to muscle relaxation techniques or psychological methods (Cruz et al., 2017).

Regarding hypertensive crises, Feitosa-Filho et al., (2008) state that 3% of visits to emergency rooms result from a significant increase in arterial hypertension, while Guedes et al. (2005) show even lower rates, of only 1% for hypertensive crises, and in these, visits to patients with hypertension are referred more frequently, and even leading people who are followed up in arterial hypertension treatment programs, to seek clinical care due to episodes of hypertensive crises. Southerland et al.,(2016) corroborate that hypertensive crises occur in 1% of patients diagnosed with hypertension and that although rare, they occur in an average of 500,000 cases. That is why Pegoraro et al. (2015) state that it is not just for one type of professional to know how to recognize the signs and how to act, but for all professionals who may be faced with these clinical situations.

Pegoraro et al. (2015) just like Lucius & Barreto (2012) say that mainly the dental surgeon must know how to proceed once fear is involved promoting anxiety and leading to stress. And if the patient presents any signs and symptoms characteristic of a hypertensive crisis, the care should be immediately stopped. The patient must be placed in a comfortable position and their vital signs must be monitored. The professional should administer captopril, at a dose of 25 mg to 50 mg, sublingually, and when the crisis is controlled, the patient should be referred for medical evaluation.

However, Guedes et al.,(2005), say that, in cases of hypertensive crises, the patient should be hospitalized and undergo treatment with intravenous vasodilators. Feitosa-Filho et al. (2008) emphasize that if the patient is previously hypertensive, it is essential to know about his/her

previous blood pressure control, antihypertensive medication in use, doses, adherence, and time when the last pill was administered.

Studies agree that drug prescription is an important aspect in the management of hypertensive patients due to the possibility of drug interactions. They are called effect interactions, when drugs or associated substances, through different mechanisms, interfere with each other's effect, potentiating or causing the opposite/rebound effect (Cruz et al., 2017).

There has been a contraindication to the use of non-steroidal anti-inflammatory drugs since these drugs can interfere with the action mechanism of antihypertensive drugs. According to Costa et al.,(2013) and Southerland et al., (2016) the use of COX-2-selective anti-inflammatory drugs is an example of this since this drug can decrease the natriuretic effect of the furosemide class. The use of non-steroidal anti-inflammatory drugs (NSAIDs) can also decrease the antihypertensive action of beta-blockers (propranolol) and angiotensin-converting enzyme inhibitors (captopril) and diuretics (furosemide). Nascimento et al., (2011) report that the reason for the contraindication of the use of non-steroidal anti-inflammatory drugs (NSAIDs) is due to the synthesis of prostaglandins decrease, essential for the metabolism of hypertensive agents. Thus, the prescription of NSAIDs to hypertensive patients causes sodium retention, with a consequent increase in the volume of intravascular fluid and an increase in blood pressure.

Studies have reported that many of the patient's oral manifestations are caused by antihypertensive drugs. Gingival hyperplasia is frequent in patients who use calcium channel blocking drugs. Xerostomia, altered taste, and increased sensitivity to the vasoconstrictor of anesthetics are common as a result of antihypertensive drugs such as diuretics, centrally acting adrenergic inhibitors, and angiotensin-converting enzyme inhibitors (Costa et al.,2013; Ferrazzo et al., 2014)) patients with arterial hypertension must undergo periodic evaluations with the dental surgeon so that their oral risk stratification is carried out and they are referred for appropriate treatment, and that the frequency of subsequent evaluations is determined by the dental surgeon.

## Conclusion

For a safe approach to the hypertensive patient, some precautions must be taken and respected. Starting with the importance of an adequate anamnesis, and evaluating the existence of other associated systemic alterations such as cardiovascular, diabetes, renal failure. Measure blood pressure at the beginning and in longer procedures, monitor during the intervention. Conduct short consultations and conduct care in order to control the patient's anxiety. Drug stress reduction control can be used to avoid high blood pressure due to emotional conditions. Care such as

choosing the appropriate anesthetic, solutions with a lower concentration of vasoconstrictor, respecting the dose and following the principles of anesthetic technique must be observed. Avoid the use of non-steroidal anti-inflammatory drugs. These precautions will avoid the practice of serious iatrogenic events in addition to guaranteeing the patient a safe and quality care.

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