Management of the dental patient with Hypertension – A literature review

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ABSTRACT:

Over one billion people suffer from hypertension, a chronic disease. When treating dental patients, it is important to take into account the disease's significant frequency. The condition is fatal because there are no signs until there are more severe issues. By analyzing preoperative blood pressure readings, conducting risk analyses, and being aware of when to consider medical consultation for a hypertensive patient in a dental context, dental professionals can frequently be on the front lines of hypertension prevention. Additionally, the oral health professional has the chance to diagnose and refer for any unidentified condition through normal follow-up consultations and patients seen urgently who might not otherwise be treated regularly. Understanding the risk factors that may predispose individuals to hypertension is essential, as is being able to inform them of their condition. Most importantly, because many antihypertensive medications interact with the pharmacologic agents used in dentistry practices, oral health care providers are in a unique position to actively participate in the management of patients who present with a history of hypertension. This review's goal is to offer techniques for handling and avoiding issues while treating a patient with hypertension who visits a dental facility.

KEYWORDS: *hypertension, a chronic disease, unidentified condition*

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INTRODUCTION:

The "silent killer" of adults older than 20 years, hypertension affects 80 million adults in the US alone and only about 1 billion people worldwide. It is estimated that there will be 1.56 billion patients with hypertension worldwide by the year 2025. One of the main risk factors for mortality from cardiovascular disease is hypertension, which causes over 7 million deaths annually. [4] Systolic blood pressure (SBP) of 140 mmHg or diastolic blood pressure (DBP) of less than 90 mmHg, or anyone who is already

using antihypertensive medication for the treatment of hypertension, are considered to have the disease. Additionally, increased blood pressure measurements on at least two occasions, with or without cause, are regarded as hypertension. [1-6]

Essential/primary hypertension and secondary hypertension are the two basic subtypes of hypertension. [7,8] Essential or primary hypertension, which accounts for 90% to 95% of all cases of hypertension, is the absence of certain identified causes for increased blood pressure. 5%–10% of US adults with hypertension who are diagnosed also have secondary hypertension, which has a known cause. [2,7,9] Aortic coarctation, Cushing's syndrome, obstructive sleep apnea, adrenal medullary dysfunction, and hormonal dysfunction, such as primary hyperaldosteronism, pheochromocytoma, hyperthyroidism, hyperparathyroidism, and hypothyroidism, are among the conditions linked to secondary hypertension. Substance abuse, alcohol intake, use of contraceptives, and chronic renal disease are additional causes of hypertension. [2,7,10–12]

Eighty million US adults with hypertension are thought to have 17.3% undetected cases. [1] Untreated hypertension has been shown to reduce life expectancy by 10 to 20 years. [13] The prevalence of hypertension in the US and around the world, the number of cases that go undetected, and the disease's projected increase make it a public health concern. The oral health care professional must be knowledgeable about the difficulties associated with this patient population's prevention, management, and treatment options in addition to the opportunities that may be present to enhance overall patient care and treatment outcomes in the dental office.

Out of 80 million US adults with hypertension 17.3% are thought to go undiagnosed.1 It has been demonstrated that untreated hypertension can shorten life expectancy by 10 to 20 years.13 Public health concerns are raised by the prevalence of hypertension in the US and other countries, the number of cases that go undiagnosed, and the disease's expected growth. The oral health care provider must be aware of the challenges posed by the preventive, management, and treatment options for this patient population as well as any potential improvements to overall patient care and treatment outcomes in the dentist's office.

Guidelines:

The American Heart Association advises routine blood pressure checks beginning at age 20 and continuing at least every two years for anyone with blood pressures of less than 120/80 mmHg. The seventh and eighth joint national committees' (JNC-7 and JNC-8) reports offer recommendations for controlling and treating blood pressure.[14,15] The >140/90 mmHg criterion for hypertension from the JNC-7 report is still the accepted practice for diagnosing people who do not also have other concomitant conditions, according to the JNC-8 panel. Prehypertension is defined as SBP 120-139 mmHg or DBP 80-89 mmHg, Stage I hypertension is defined as SBP 140-159 mmHg or DBP 90-99 mmHg, and Stage II hypertension is defined as SBP 160 mmHg

or DBP 100 mmHg, according to the most recent references for evaluating hypertension. [9,14] Hypertensive crisis is defined as a blood pressure reading of >180/120 mmHg, with or without end-organ damage. Finally, "white coat" hypertension is defined as consistently elevated blood pressure in an office setting in patients who had not previously had elevated readings during a 24-hour period. [9,12] Home blood pressure readings of 135/85 mmHg or 24-hour ambulatory blood pressure monitoring findings showing readings of 130/80 mmHg are used to validate white coat hypertension. [16]

It's critical to feel at ease recognizing illnesses connected to hypertension and making judgments regarding appropriate treatment planning, which would involve referral and follow-up for outpatient care as well as urgent evaluation when necessary for treatment. Before local anesthesia is administered, blood pressure readings are taken to establish a baseline status and help identify patients who may be too ill to receive treatment. Both brand-new individuals and regular patients should use this procedure. [11] By sending patients early for hypertension management, this practice not only enables dental professionals to treat patients in a safer setting but also improves the overall health outcomes for patients diagnosed with hypertension.

The auscultatory method, which uses mercury, aneroid, or hybrid sphygmomanometer, is a simple way to measure blood pressure. [11] The mercury sphygmomanometers are thought to be the most precise tools for measuring blood pressure, but their use has declined. [12] The sort of equipment that is most frequently used in dental offices is aneroid. Although they are simple to use, they need to be calibrated at least once every six months. [12] Patients who monitor their blood pressure at home and practicing physicians both frequently utilize automatic digital devices for the arm, wrist, or finger. To make sure they are accurate, it is advised that they too undergo frequent calibration. [11]

A patient must be sat calmly in a chair for at least five minutes, with their feet flat on the floor, and their arms held at their chests in order to take an appropriate blood pressure reading. [2,9] At least two measures should be made throughout the procedure with an appropriate-sized cuff, one with a bladder that covers at least 80% of the arm.

Providing extensive education is essential to preventing hypertension in people who are normotensive or have prehypertension. In this population, explaining the disease's risk factors (Table 2) and offering guidance on lifestyle changes like weight loss, diet changes (such as the DASH diet), reduced sodium intake, increased physical activity, and alcohol restriction could prove to be lifesaving. [11,12,14]

The number of drugs used to treat hypertension is significant, and they fall into a wide range of categories in terms of how they work and function. Most antihypertensive drugs work physiologically or pharmacologically by centrally acting on baroreceptors and the adrenergic pathway(s) as well as peripherally acting on the renin-

angiotensin-aldosterone system. [8] To achieve a blood pressure target of 150/90 mmHg or 130-140/90 mmHg for people with moderate-to-severe renal/diabetic disease(s), antihypertensives can be given as monotherapy or in combination with two or more other medications. [1] When used as monotherapy, the following six major classes of antihypertensive medications are reported to have nearly equivalent blood pressure-lowering effects: thiazide diuretics, beta-blockers, angiotensin-converting enzyme inhibitors (ACEIs), angiotensin II receptor blockers, calcium channel blockers (CCBs), and alpha-2 blockers.

Most antihypertensive medications lower blood pressure by 8-10/4-7 mmHg in standard dosages. [21] The dental professional should be knowledgeable about drugs that can potentially have a negative impact on blood pressure management (Table 3), as well as frequently prescribed antihypertensive drugs, their side effects, and drug-drug interactions (Table 4). The sections that follow describe the main antihypertensive classes.

Diuretics:

Diuretics encourage the production of urine by increasing the excretion of sodium and water from the body, decreasing blood volume, and thus, decreasing blood pressure. This is accomplished by modifying how the kidney regulates sodium. [8] At different parts of the renal tubular system, sodium and water are regulated. [8] Diuretics including loop, thiazides, and potassium-sparing diuretics are used to treat hypertension. Thiazide-type diuretics, such as chlorthalidone, hydrochlorothiazide, and indapamide, are a few examples of often prescribed diuretics. The loop diuretics (furosemide, torsemide, bumetanide, and ethacrynic acid) and potassium-sparing diuretics (spironolactone, amiloride, triamterene, and eplerenone) make up the other class of diuretics.8 Hypokalemia, hyperlipidemia, constipation, hyperglycemia, muscle cramps, headaches, increased sweating, volume depletion that may cause excessive thirst, and hyperglycemia are side effects linked to this family of drugs.

Another negative impact linked to ethacrynic acid consumption is ototoxicity, which is most likely related. [8] Ototoxicity can present as a cluster of symptoms including tinnitus, hearing loss, deafness, vertigo, and a feeling of fullness behind the ears. It most usually occurs in situations when fast intravenous administration is taking place and is least likely to occur when oral administration is taking place. These symptoms are ones that patients may mention to their dentist. [24] Nonsteroidal anti-inflammatory drugs (NSAIDs), concurrent barbiturate use, elevated plasma levels of fluconazole and erythromycin when used concurrently, and orthostatic hypertension are all examples of adverse drug-drug interactions with diuretics that are frequently observed. [23]

Beta-blockers:

Drugs called beta-blockers bind to beta-adrenoceptors, lowering heart rate and contractility, and ultimately lowering cardiac output. [8] Cardio-selective and nonselective

beta-blockers are the two other subgroups of beta-blockers. Beta-blockers that are cardio-selective work on beta-1 receptors instead of the beta-2 receptors found on vascular smooth muscle cells and the lungs. Metoprolol, atenolol, nebivolol and bisoprolol are a few examples. [23] Carvedilol, propranolol, nadolol and sotalol are examples of nonselective beta-blockers. [23] Bradycardia, hypotension, lightheadedness, shortness of breath, and weariness are typical adverse reactions. [8,21] Reduced antihypertensive effects from NSAIDs can result from unfavorable medication interactions. [23] When administered concurrently with beta-blockers, interactions with local anesthetics can result in a reduced rate of amide metabolism. [25]

ACE inhibitor:

Angiotensin II production is decreased, bradykinin levels are raised, sympathetic nervous system activity is decreased, and cardiac workload is decreased as a result of ACEIs. [8] Captopril, enalapril, lisinopril, benazepril, and ramipril are some of the often-prescribed medications. [23] A dry, ineffective cough, angioedema, hypotension, headache, weakness, and odd taste are all potential side effects of ACEIs. [23] Due to their potential to reduce angiotensin II production and, consequently, their diminished capacity to constrict the efferent arteriole and maintain glomerular filtration when renal perfusion is low, ACEIs may also be linked to acute kidney injury. Patients who have unilateral renal artery stenosis or bilateral stenosis in the context of a single kidney are susceptible. Patients who have recently had dental work done, have decreased by-mouth intake due to this, have diarrhea, or use diuretics may also be at risk. [24] While concurrent use of NSAIDs and ACEIs may have antihypertensive effects similar to those of beta-blockers, it may also increase the risk of acute kidney injury, especially in patients with volume depletion. Concomitant use of ciclosporins with ACEIs may contribute to an increased risk of acute renal failure. [23,26]

Angiotensin II receptor blocker:

Antihypertensive medications known as angiotensin II receptor blockers target angiotensin II specifically by competitively inhibiting the angiotensin II receptor. The blood arteries in the glomerulus respond by vasodilating, which lowers blood pressure simultaneously. [27] Irbesartan, Candesartan, Telmisartan, Olmesartan, Losartan, and Valsartan are medications that are prescribed in this category. [28] Similar to ACEIs, adverse symptoms manifest; however, cough and angioedema are substantially less common. [8] Losartan may interact with medications like cimetidine, fluconazole, indomethacin, phenobarbital, and rifampin because of its connection to the cytochrome P450 system. [28]

Calcium channel blocker:

By blocking the L-channel, which lowers intracellular calcium and results in vasodilation, CCBs, also known as calcium channel antagonists, lower vascular resistance. In addition to producing a

detrimental ionotropic and chronotropic effect, CCBs can increase vascular smooth muscle relaxation (vasodilation) by preventing calcium entrance into the cell. Conduction velocity in the heart is slowed down as a result, especially at the atrioventricular node. [29] The three main classes of CCBs are as follows. [8] The smooth muscle selective class of dihydropyridines is the one that is most frequently utilized. Amlodipine, felodipine, nifedipine, isradipine, nicardipine, and nisoldipine are medications that fall under this category. [8] Benzothiazepines and phenylalkylamines are examples of the non-dihydropyridines. Verapamil, a diphenylalkylamine, and diltiazem, a benzothiazepine, both influence cardiac and vascular smooth muscle cells, are used to treat high blood pressure. [8] Flushing, headaches, lightheadedness, severe hypotension, reflex tachycardia, and peripheral edema are examples of adverse responses. [8] With the usage of CCBs, gingival hyperplasia can occur anywhere between 1.7% and 38% of the time. [9] The most frequent nifedipine side effect is gingival hyperplasia. [9] Surgery may lessen painful bleeding gums, but drug withdrawal is typically required for full symptom relief. Combining CCBs and benzodiazepines can lead to drug-drug interactions, which often cause greater sedation. [23] When taken together with CCBs, especially diltiazem and verapamil, elevated levels of calcineurin inhibitors such cyclosporine or tacrolimus may be visible. [30] It has also been shown that medications such erythromycin, cimetidine, and rifampin can alter the plasma levels of CCBs. [23]

Alpha blocker:

By interacting with alpha-adrenergic receptors on vascular smooth muscle cells, alpha-blockers or alpha-adrenergic antagonists reduce peripheral vascular resistance by acting on the sympathetic autonomic neurons that innervate blood vessels. [8] There are two types of alpha-blockers: competitive and noncompetitive alpha-adrenoceptor blockers. [8] The use of nonselective antagonists is often limited to hypertensive situations brought on by pheochromocytomas. Phenoxybenzamine and phentolamine are the two medicines that are most frequently administered for pheochromocytomas. [23] Prazosin, Terazosin, and Doxazosin are examples of selective alpha-blockers. [8] Due to the poor therapeutic outcomes associated with monotherapy, these medications are most frequently used in combinations with other medications. [8] These medications frequently cause a variety of adverse effects, such as reflex hypertension, nausea, vomiting, dizziness, and orthostatic hypotension. [8]

Dental considerations:

While there is no demonstrated direct connection between dental treatment and complications of hypertension, [2] it is important for oral health care providers to understand the potential risks and complications that may occur while these individuals are receiving treatment in the

dental practice setting. The following are examples.

Side effects of hypertensive drugs:

Similar to other medications, high blood pressure treatments can have negative reactions and side effects. It is crucial that the person providing oral health care is aware of the many kinds of reactions they could bring on. Even though the majority of people who use hypertension drugs experience minor or no side effects, it is still crucial to keep informed and work closely with the doctor to address any issues that may arise. If the patient experiences adverse effects, the patient's doctor can choose from a variety of prescription options. There are frequently oral side effects and drug-drug interactions. List the groups of antihypertensive medications that have oral side effects and drug interactions. Routine and surgical procedures in the dental office typically require administration of local anesthetics with or without epinephrine, which may react negatively with beta-blockers. In addition, conscious sedation has become a common practice in many dental offices in management of patients with fear and anxiety. Finally, NSAIDs and antifungal medications may interact negatively with beta-blockers.

Hypertensive crisis:

The frequency of hypertensive crises in people with a diagnosis of hypertension is less than 1%. [4] Although uncommon, there are half a million occurrences in the US each year. [4] Urgency and emergency can be further split into hypertensive crisis or acute hypertension. [3] Hypertensive urgency is defined as markedly high blood pressure with no concomitant end-organ damage (systolic pressure 180 mmHg and/or diastolic pressure 120 mmHg). [3,4,8] An emergency characterized by hypertension is one in which the target organs are damaged. [2–4,8] Although there are several risk factors for hypertensive crisis, generally speaking, medication noncompliance is one of the most important ones. [3,8]

While in the office, a detailed history should be taken. When patients appear with increased blood pressure >180/120 mmHg or an abrupt increase in blood pressure following a previously normal baseline, the following factors should be taken into account:31 neurologic deficits related to ischemic or hemorrhagic stroke, nausea and vomiting related to hypertensive encephalopathy and elevated intracranial pressure, back pain related to aortic dissection, dyspnea related to pulmonary edema, and chest discomfort related to myocardial ischemia or aortic dissection. Preeclampsia and the potential for eclampsia, which can be fatal, can emerge from pregnancy's ability to cause or exacerbate severe hypertension. It is necessary to record and stop using any pharmacologic substances that can cause a hyperadrenergic condition, such as cocaine, amphetamine, phencyclidine, or monoamine oxidase inhibitors.

Bleeding:

During surgical procedures, high blood pressure can cause significant intraoperative bleeding. [38] Once more, selecting when to

do particular treatments depends on knowing the patient's history, and care should be used when performing surgery. People are treated with various anticoagulant medicines due to a variety of comorbidities. Anticoagulation should normally not be stopped for minor surgery in patients with an international normalized ratio value of 4. [39] Again, it is advised to continue taking aspirin and other antiplatelet medications like rivaroxaban and clopidogrel throughout minor surgery. [40]

The control of bleeding can be aided by the use of several hemostatic drugs. Application of local anaesthesia with vasoconstrictors, chitosan-based products, bone wax, fibrin sealants, epsilon-aminocaproic acid, tranexamic acid, oxidised cellulose, aluminium chloride, ferric sulphate, aluminium potassium sulphate, zinc chloride, trichloroacetic acid, and tannic acid, as well as utilising cordless retraction techniques helps in controlling bleeding when performing surgical or restorative procedures. [41,42]

Blood pressure values and risk assessment:

When multidisciplinary teams collaborate, it results in complete patient care and ample delivery of comprehensive care. Hence, the aforementioned combined approaches would help in proper assessment and care of the patient with high blood pressures encountered during the dental treatment. [43] It has been widely documented in the literature that a blood pressure reading of 180/110 mmHg is the absolute cutoff point for receiving any dental treatment. [44] Studies have shown that patients receiving treatment with a blood pressure 180/110 mmHg do not have an elevated risk for unfavorable perioperative outcomes. The absolute threshold that has been reported may actually be too high for individuals with histories that include prior hypertensive-related organ damage, such as myocardial infarctions, strokes, or labile angina, to get treatment, even on an emergency basis. Treatment of these patients should be based on judgement. The classification by the American Society of Anesthesiologists and use of metabolic equivalents (METs) could be helpful when stratifying the risk associated with treating patients in a dental setting. [9]

CONCLUSION:

The research has a lot to say on how to treat hypertensive patients, especially in a dental setting. The care of hypertension patients frequently changes, and new information is frequently published about them. The greatest possible patient care must be maintained by putting these new improvements into practice. A dental provider must be knowledgeable about the condition, be aware of available treatment choices, and have the capacity to inform patients and give them access to care. The advice for treating these patients is primarily based on the practitioner's professional judgement. Prior to providing care for these patients, the practitioner should be able to evaluate the patient's health status and make the appropriate choices based on the following considerations: baseline blood pressure, the procedure's urgency, the patient's functional and physical status, the

procedure's length of time and degree of invasiveness. Most importantly, you should always consider medical counsel when in doubt. Always put the patient's well-being first.

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