



The relationship between arterial hypertension and dental procedures: impact on treatment and prevention of complications

La relación entre hipertensión arterial y procedimientos dentales: impacto en el tratamiento y prevención de complicaciones

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Artyom Alexandrovich Bruzda, Saratov State Medical University named after V.I. Razumovsky Saratov, 112 Bolshaya Kazachya str , 410012, Russia. bruzda2001@mail.ru, <https://orcid.org/0009-0005-9619-8959>

Tatiana Sergeevna Petriakova, Saint-Petersburg University, 7-9 Universitetskaya Embankment, St Petersburg, 199034, Russia. peta-spb@mail.ru, <https://orcid.org/0009-0008-5182-5404>

Konstantin Valerevich Ignatev, Chuvash State University named after I.N. Ulyanova, 15 Moscow Avenue, Cheboksary, 428015, Russia, kostaignatev635@gmail.com, <https://orcid.org/0009-0008-6999-1734>

Bulat Ilurovich Shafigullin, Chuvash State University named after I.N. Ulyanova, 15 Moscow Avenue, Cheboksary, 428015, Russia, 7futbol@mail.ru, <https://orcid.org/0009-0000-0811-4465>

Navruza Rustamjon kizi Kholmanova, The Pavlov First Saint Petersburg State Medical University, L'va Tolstogo str. 6-8 Saint Petersburg, Russia 197022, navruzakholmanova@gmail.com, <https://orcid.org/0009-0005-4556-8075>

Artem Vitalevich Khomich, Saratov State Medical University named after V. I. Razumovsky, Bolshaya Kazachya Street, 112, Saratov, 410012, Russia. jeeymaz@bk.ru, <https://orcid.org/0009-0006-3181-9432>

Javlonbek Kabulboy ugli Rakhmankulov, The Pavlov First Saint Petersburg State Medical University, L'va Tolstogo str. 6-8 Saint Petersburg, Russia 197022, javlonbekrakhmankulov@gmail.com, <https://orcid.org/0009-0008-6633-6857>

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Abstract

This article discusses the relationship between arterial hypertension (AH) and dental procedures, as well as the impact of this disease on treatment and prevention of complications. Arterial hypertension, being one of the most common chronic pathologies of the cardiovascular system, can have a significant impact on the process of dental treatment. The paper analyses the risk factors associated with the increase of blood pressure in patients during dental interventions, the features of pharmacotherapy, as well as the role of dentists in the early detection of hypertension. Particular attention is paid to the necessity of correct choice of anesthesia and anesthetic techniques, as well as the importance of blood pressure control before, during and after procedures to reduce the risk of complications such as hypertensive crises and bleeding. The article emphasizes the importance of a multidisciplinary approach to the management of patients with arterial hypertension, including coordination between dentists and general practitioners to improve the safety and effectiveness of medical interventions.

Keywords: arterial hypertension, dental procedures, complications, treatment, prevention, anesthesia, blood pressure control, hypertensive crisis, multidisciplinary approach.

Resumen

Este artículo analiza la relación entre la hipertensión arterial (HA) y los procedimientos odontológicos, así como el impacto de esta enfermedad en el tratamiento y prevención de complicaciones. La hipertensión arterial, al ser una de las patologías crónicas más comunes del sistema cardiovascular, puede tener un impacto significativo en el proceso de tratamiento dental. El artículo analiza los factores de riesgo asociados con el aumento de la presión arterial en pacientes durante intervenciones dentales, las características de la farmacoterapia, así como el papel de los dentistas en la detección temprana de la hipertensión. Se presta especial atención a la necesidad de elegir correctamente la anestesia y las técnicas anestésicas, así como a la importancia del control de la presión arterial antes, durante y después de los procedimientos para reducir el riesgo de complicaciones como crisis hipertensivas y hemorragias. El artículo enfatiza la importancia de un enfoque multidisciplinario para el tratamiento de pacientes con hipertensión arterial, incluida la coordinación entre dentistas y médicos generales para mejorar la seguridad y eficacia de las intervenciones médicas.

Palabras clave: hipertensión arterial, procedimientos odontológicos, complicaciones, tratamiento, preven-

ción, anestesia, control de la presión arterial, crisis hipertensiva, abordaje multidisciplinario.

Introduction

Arterial hypertension (AH) is one of the most common chronic diseases of the cardiovascular system, affecting millions of people worldwide¹. This condition is characterised by a sustained increase in blood pressure, which significantly increases the risk of cardiovascular complications such as stroke, myocardial infarction and heart failure. At the same time, a large number of patients with AH require dental treatment, which poses a challenge for medical professionals to ensure safe and effective management of such patients.

Dental procedures, whether caries treatment, tooth extraction or more complex surgical interventions, can involve significant stress, pain and medication use, which can cause acute spikes in blood pressure². Underestimation of these risks can lead to serious complications including hypertensive crises and bleeding during or after interventions.

In addition, arterial hypertension is often accompanied by the intake of antihypertensive and anticoagulant medications, which also requires special attention from the dentist when planning and performing treatment. The administration of anesthesia, the choice of medication and postoperative follow-up all need to be adapted to the patient's condition.

The aim of this paper is to investigate the relationship between arterial hypertension and dental procedures, and to consider possible approaches to the prevention and management of complications for patients having this disease.

Materials and methods

The following theoretical methods were used for writing the article. A study of existing scientific publications, monographs, clinical recommendations and guidelines on arterial hypertension and dentistry was carried out. This method will help to collect relevant information about the impact of hypertension on dental treatment, as well as to study modern approaches to the prevention of complications.

Based on the literature review, the results of various studies and clinical observations were summarized. This made it possible to identify general patterns and trends

regarding the influence of arterial hypertension on the outcome of dental procedures.

The comparative analysis method allowed comparison of different approaches to the treatment of patients with arterial hypertension in dental practice, while knowledge systematization allowed structuring information regarding risk factors associated with hypertension, pharmacotherapy features and precautions in dental treatment. The classification method was used to categorize complications arising from dental procedures in patients with arterial hypertension by type (e.g. cardiovascular, bleeding, complications related to drug therapy).

The method of data interpretation made it possible to explain the identified patterns and relationships between arterial hypertension and dental procedures, and to offer practical recommendations to minimize the risks. The application of these methods made it possible to construct a logical and well-founded study, and to formulate conclusions based on an in-depth theoretical analysis of the problem.

Results

Arterial hypertension (AH) and dental procedures are closely related, as hypertension has a significant impact on the choice of treatment methods as well as on the prevention of possible complications during and after dental interventions³. In patients with AH, elevated blood pressure may exacerbate the risks of dental procedures, especially invasive procedures such as tooth extractions, surgical procedures and complex prosthodontics.

Anesthesia is an important aspect of dental treatment, especially for patients with arterial hypertension (AH), as inappropriate drugs or doses can significantly increase the risk of complications. A major problem is the use of local anaesthetics containing vasoconstrictors such as adrenaline (epinephrine), which can provoke sudden spikes in blood pressure.

Vasoconstrictors are added to local anaesthetics to constrict blood vessels and prolong the effect of anesthesia by reducing bleeding at the injection site. However, for patients with AH, the use of anaesthetics containing such substances can be dangerous. Vasoconstrictors increase heart rate and cause an increase in systemic blood pressure, which can lead to hypertensive crisis or even cardiovascular accidents such as stroke or myocardial infarction⁴.

Before dental procedures, patients with arterial hypertension should have their blood pressure measured. If it is above threshold values (e.g. above 180/110 mmHg),

routine dental procedures should be postponed until the patient's condition has stabilized. In case of uncontrolled hypertension, the use of anaesthetics with vasoconstrictors is strongly discouraged.

When treating patients with AH, it is important to give preference to local anaesthetics containing minimal doses of vasoconstrictors (e.g. 1:200,000) or to consider anaesthetics without them. Preparations such as mepivacaine do not contain adrenaline and are considered safer for patients with hypertension, especially in cases of unstable BP. If the use of adrenaline is still necessary to provide effective anesthesia and control bleeding, its dosage should be strictly limited. Minimal concentrations of adrenaline (e.g. 1:200 000 or lower) and a limited number of injections are recommended⁵.

It is important to keep in mind that intravascular injection of anaesthetics should be avoided when injecting anaesthetics, as this can cause rapid and severe systemic vasoconstrictor effects, including a sudden increase in blood pressure. Dentists should use an aspiration technique before injection to ensure that the needle does not enter a blood vessel.

Patients with AH often take antihypertensive medications such as beta-blockers, angiotensin-converting enzyme (ACE) inhibitors, calcium channel blockers, or diuretics. These medications may interact with anaesthetics containing vasoconstrictors. For example, beta-blockers can increase the presser effect of adrenaline, causing an even more pronounced increase in blood pressure.

Patients taking beta-blockers may be particularly sensitive to the effects of adrenaline, which can lead to uncontrolled spikes in blood pressure and slow heart rate. Calcium channel blockers may increase the vasodilatation effect, which reduces the risk of hypertension, but this may lead to abrupt changes in blood pressure during the procedure⁶.

During dental treatment, patients with AH require close monitoring of blood pressure. It is important to monitor blood pressure not only before but also during the procedure, especially if anaesthetics with vasoconstrictors are administered. If a significant increase in blood pressure is detected (e.g. above 180/110 mmHg), the dental intervention should be stopped immediately until the patient's condition has stabilized. If there are increased risks associated with the use of local anaesthetics, alternative methods of anesthesia may be considered. General anesthesia can be used for some patients with unstable AH, but this requires careful assessment of cardiovascular status and the presence of an anesthetist. The use of sedatives (e.g. benzodiazepines) before dental procedures may help to reduce anxiety and stress, which reduces the likelihood of a sudden increase in blood pressure.

Thus, the correct choice and dosage of anesthesia in patients with arterial hypertension is a critical aspect of

dental treatment. The use of high doses of adrenaline should be avoided and blood pressure should be carefully monitored before, during and after the procedure. It is important to consider possible interactions between anaesthetics and antihypertensive drugs and to take steps to minimize the risk of complications.

Stress is an important factor influencing blood pressure in patients with arterial hypertension (AH), especially in the context of dental procedures. For many people, a visit to the dentist is a source of anxiety and stress, which can lead to significant increases in blood pressure. For patients with AH, this is particularly dangerous, as stress can exacerbate their condition, triggering hypertensive crisis and other complications.

Stress caused by dental procedures activates the sympathetic nervous system, which causes the release of stress hormones such as adrenaline and noradrenalin. These hormones contribute to vasoconstriction, increased heart rate and increased blood pressure. This process may be more pronounced in hypertensive patients due to their predisposition to hypertensive reactions to external stimuli⁷.

Stress also increases pain and discomfort, which increases the overall level of anxiety and can lead to a vicious cycle where stress and pain reinforce each other, contributing to further increases in blood pressure. Dental procedures accompanied by pain or fear can cause a spike in blood pressure in patients with AH. This is especially dangerous during surgical procedures such as tooth extraction or implantation, where an increase in blood pressure can cause hypertensive crisis, bleeding or cardiac complications.

Patients with hypertension may experience palpitations, dizziness, nausea and severe anxiety during dental procedures. These symptoms may be associated with a sudden increase in blood pressure and require immediate attention from the clinician.

Stress can reduce the effectiveness of local anesthesia, as the anesthetic may be metabolized more quickly in conditions of increased adrenaline levels in the body. This may lead to the need to increase an anesthetic dose, which increases the risks for patients with AH, especially if vasoconstrictor drugs are used⁸.

In order to minimize stress and its effect on blood pressure during dental treatment, it is important to use integrated methods that target the physical and emotional state of the patient. One of the most important methods of stress reduction is psychological preparation of the patient in advance. Explaining the treatment plan, discussing possible sensations and actions of the doctor helps to reduce uncertainty, this is a key factor in anxiety. It is important to explain each step of the procedure to the patient, give him/her the opportunity to ask questions and express his/her concerns.

The use of sedation or sedation techniques can significantly reduce stress levels in a patient with AH. Medications such as benzodiazepines (e.g. diazepam or midazolam) may be administered to the patient before the procedure to reduce anxiety. This helps prevent an increase in blood pressure by blocking the overreaction to stress.

The use of nitrous oxide during dental procedures is a safe and effective method to reduce anxiety and minimize the stress response to manipulation. In more complex cases, intravenous sedation under the supervision of an anesthetist can be used, which provides deep relaxation and eliminates acute stress reactions.

In dental offices, it is important to create the most comfortable and calming atmosphere possible. This may include the use of soft lighting, relaxation music, and discussing with the patient any activities that may cause anxiety. Positioning the patient comfortably in the chair and providing a comfortable temperature can also reduce the physical discomfort that contributes to stress⁹.

Pain is one of the strongest stimuli for stress. Effective pain management, whether local anesthesia or the use of additional pain medication, helps prevent the development of a stress response. For patients with AH, it is important not only to choose an anesthetic carefully, but also to ensure that it is fully effective before starting the procedure.

Patients can be taught deep breathing and muscle relaxation techniques to reduce stress levels before and during dental manipulation. For example, breathing exercises or meditation techniques can help stabilize blood pressure levels and reduce anxiety.

Empathy and support from the dentist also play an important role in reducing stress. It is important that the dentist is available to answer any questions the patient may have, explain how they plan to control pain and discomfort, and that they will monitor the patient's condition at all stages of the procedure¹⁰.

After a dental procedure, stress may continue due to pain, swelling, or anxiety about the outcome of the treatment. For patients with AH, postoperative stress can also cause blood pressure to rise again. It is important to monitor the patient's condition in the first hours after treatment, especially if the procedure was invasive.

Adequate analgesia after the procedure helps to reduce the likelihood of blood pressure rises due to the stress of pain. Drugs that may interact with antihypertensive should be avoided and safe analgesics for hypertensive patients, such as paracetamol or ibuprofen (unless contraindicated), should be favored. For patients with high stress levels, it is important to provide post-procedural oral care advice and to ensure that they keep in touch with their doctor in case of complications. This reduces

anxiety and helps the patient feel more confident after the procedure.

Stress plays a key role in increasing blood pressure in hypertensive patients during dental procedures, increasing the risk of complications. To minimize this risk, it is important to take a comprehensive approach including psychological preparation of the patient, sedation, pain control and a comfortable environment. Close monitoring of blood pressure and the use of stress management techniques will help to ensure the safety of dental procedures and reduce the likelihood of hypertensive crises¹¹.

Bleeding is one of the most frequent complications of dental procedures, especially in patients with arterial hypertension (AH). High blood pressure negatively affects vascular health and can lead to complications during invasive interventions such as tooth extractions, periodontal surgeries and implants. In addition, many patients with AH take anticoagulants or antiaggregants to prevent cardiovascular events, further increasing the risk of bleeding. Adequate management of these risks is an important part of dental treatment planning in patients with hypertension.

Patients with poorly controlled hypertension are at increased risk of bleeding, even during relatively simple dental procedures. High blood pressure makes it difficult for blood vessels at the site of injury to close effectively, which delays thrombus formation and makes it more difficult to stop bleeding.

Before performing dental procedures on a patient with AH, a careful history should be taken and blood pressure should be measured. If the blood pressure exceeds 160/100 mmHg, it is recommended to postpone the procedure until it has stabilized. For patients with uncontrolled hypertension, there is a high risk of bleeding and other complications such as hypertensive crisis or myocardial infarction¹³.

Anticoagulants and antiaggregants require special attention. It is important to discuss with your doctor in advance the need for temporary withdrawal or dosage adjustment of such drugs before complex dental procedures. For example, patients taking warfarin should have their international normalized ratio (INR) monitored to ensure that it is within a safe range (usually 2-3) prior to intervention.

Dentists should aim to minimize trauma during the treatment of patients with AH. This includes using microsurgical instruments, techniques that provide less tissue damage, and performing manipulations that require smaller surgical volumes. For example, staged tooth extraction may be considered if the patient has a high risk of bleeding.

Successful dental procedures in patients with AS require careful planning and the use of special measures to minimize the risk of bleeding:

It is important to use modern topical haemostatic preparations such as haemostatic sponges, collagen plates, fibrin glue or alginate gels to help stop bleeding directly at the site of injury. Suturing after surgical procedures helps to reduce the risk of subsequent bleeding, especially in patients with high blood pressure. It is also important to provide adequate tamponade after tooth extraction or other surgeries to pressurize the vessels and stimulate thrombosis¹⁴.

Patients with hypertension should be under continuous blood pressure monitoring throughout the procedure to avoid significant pressure fluctuations that may provoke bleeding. It is important to monitor blood pressure both before and during the procedure.

Patients with hypertension should receive clear oral care advice after the procedure. For example, they should avoid vigorous mouthwash for the first 24-48 hours after surgery, as this can lead to clot removal and recurrence of bleeding. It is also important to refrain from physical activity and head tilting, which can cause an increase in blood pressure. Postoperative pain can cause stress and increased blood pressure in patients with AH, which increases the risk of bleeding. Therefore, it is important to prescribe analgesics such as paracetamol or ibuprofen in time to control pain without adversely affecting blood pressure.

Bleeding during dental procedures by patients with arterial hypertension can be a serious complication requiring careful treatment planning. Particular attention should be paid to blood pressure monitoring, correction of drug therapy and the use of topical haemostatic agents. The use of minimally traumatic techniques, careful postoperative observation and adherence to oral care recommendations will help to reduce the risk of bleeding and ensure patient safety.

Discussion

The treatment of patients with arterial hypertension (AH) requires the integration of different specialists to ensure their safety and improve therapeutic outcomes. In the case of dental procedures, which may involve health risks for these patients, a multidisciplinary approach involving close collaboration between dentists and general practitioners is important. Coordination between these specialists plays a key role in timely diagnosis, correction of treatment and prevention of complications such as bleeding, increased blood pressure, cardiovascular crises and delayed healing.

Patients with AH often take combination antihypertensive therapy, which may include diuretics, beta-blockers, ACE inhibitors, calcium channel antagonists and antiaggregants. These drugs can cause side effects that affect oral health and the body's overall response to dental procedures. For example, anticoagulants and antiaggregants increase the risk of bleeding, and some antihypertensive drugs cause dry mouth, which increases the risk of dental caries and inflammation¹⁶.

For safe dental interventions, it is important that the dentist is aware of the patient's current medication and understands possible drug interactions with anaesthetics and other agents. This requires coordination with the general practitioner who can make adjustments to treatment, such as temporarily cancelling or changing the dosage of anticoagulants prior to surgery. Discussing the treatment plan together can minimize the risks of complications and improve the outcome.

Patients with AH require continuous blood pressure monitoring before and during dental procedures. The therapist plays an important role in stabilizing the patient's blood pressure before treatment to avoid complications such as hypertensive crisis or cardiac disturbances during dental manipulations¹⁷.

The interaction between the dentist and the therapist allows for proper risk assessment of the patient and preparation of the patient for the procedure. It is important for the therapist to provide recommendations for pressure control based on the patient's medical history and possible complications. In some cases, the therapist may prescribe additional hypertensive medications prior to the procedure or adjust current therapy to reduce risk.

Stress during dental procedures can cause an increase in blood pressure, especially in patients with AH. This can lead to hypertensive crisis, bleeding or cardiovascular complications. Dentists should assess the patient's anxiety level and use sedation or psychological techniques to reduce stress if necessary¹⁸.

Coordinating the use of sedation or anxiolytics with the therapist prior to the procedure is also an important aspect of a multidisciplinary approach. The therapist can recommend safe dosages of medication, taking into account the patient's current health status and their underlying antihypertensive therapy. This reduces the risk of unexpected reactions and blood pressure-related complications.

The postoperative period in patients with arterial hypertension requires special attention from the dentist and general practitioner. It is important to monitor the patient's blood pressure and oral health, especially if anti-coagulants have been used or the patient is taking other drugs that affect blood coagulation. The therapist should be informed of possible complications in order to adjust treatment in the postoperative period, including the choice of antihypertensive and analgesic medications that will not adversely affect the patient's condition.

In addition, working together helps prevent possible infections or delayed wound healing, especially in patients in whom antihypertensive drugs or other factors may affect tissue regeneration. For example, taking calcium channel antagonists may cause gingival hyperplasia, which should be discussed with a general practitioner.

Patients with arterial hypertension are often poorly informed about how their condition may affect dental treatment and the need to inform the dentist of all medications taken. A joint effort between the dentist and general practitioner can help patients to better understand their risks and prepare properly for procedures¹⁹.

Dentists and therapists can work together to provide patients with guidance on proper oral and general health care to help reduce the risk of complications and improve outcomes. This is especially important for patients with uncontrolled hypertension, who require closer monitoring and individualized care.

An interdisciplinary approach to treating patients with arterial hypertension allows for better coordination between specialists, which improves the safety and effectiveness of dental procedures. The interaction between dentist and general practitioner helps to reduce the risks of complications associated with arterial hypertension and ensure optimal treatment outcomes. This approach includes medication therapy coordination, blood pressure control, stress management, postoperative monitoring and patient education, making treatment more successful and safer for patients with hypertension.

Conclusions

Arterial hypertension (AH) is one of the most common diseases that has a significant impact on dental treatment. Patients with AH require a special approach based on knowledge of their condition, the antihypertensive therapy taken and possible complications related to both the disease itself and its treatment. The effect of antihypertensive drugs on the oral cavity, as well as their interaction with anaesthetics and other agents used in dentistry, requires careful planning of each intervention.

AH and dental procedures are closely related, as uncontrolled blood pressure can lead to serious complications during and after procedures. It is important for dentists to monitor patients' blood pressure during all stages of treatment.

Antihypertensive therapy significantly affects oral health and can complicate dental interventions. Some drugs cause dry mouth, gingival hyperplasia, increase the risk of bleeding and interact with anaesthetics, which require an individual approach to each patient.

An interdisciplinary approach is fundamental to the safe and successful treatment of patients with AH. Coordination between dentists and general practitioners allows timely adjustment of drug treatment, controlling risks and minimizing the possibility of complications.

Prevention of complications is a key task when working with patients with arterial hypertension. Incorporating patient monitoring, careful risk assessment and adjustment of antihypertensive therapy into the treatment plan allows for more effective treatment and improved safety.

Thus, treatment of patients with AH requires from the dentist not only the skills of dental procedures, but also knowledge of the mechanisms of action of antihypertensive drugs, the ability to work in a team with other specialists and an attentive approach to each patient.

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