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INFLUENCE OF ARTERIAL HYPERTENSION ON ORAL MUCOSAL AND PERIODONTAL HEALTH

Yuldasheva N.A., Shoikramova N.Sh.

Tashkent state medical university.

Abstract. Arterial hypertension is among the most prevalent chronic cardiovascular diseases and is associated with systemic microcirculatory impairment that may affect oral tissues. This paper aims to analyze the impact of arterial hypertension on the oral mucosa and periodontal tissues from the perspective of pathophysiological mechanisms and clinical manifestations. Key pathways are discussed, including endothelial dysfunction, vascular remodeling, tissue ischemia and trophic disturbances, as well as the role of antihypertensive therapy in the development of xerostomia and periodontal changes. The most common oral findings in hypertensive patients are summarized: mucosal dryness, alterations in mucosal color and elasticity, increased susceptibility to microtrauma and delayed healing, along with a higher prevalence of inflammatory periodontal diseases. The relevance of an interdisciplinary approach and preventive strategies to reduce periodontal complications in hypertensive patients is emphasized.

Keywords: arterial hypertension, oral mucosa, periodontium, microcirculation, endothelial dysfunction, xerostomia, periodontitis.

Introduction

Arterial hypertension is one of the most prevalent chronic disorders of the cardiovascular system and is associated with systemic disturbances of vascular regulation and microcirculation. Persistent elevation of arterial blood pressure leads to endothelial dysfunction, vascular wall remodeling, and reduced tissue perfusion, resulting in hypoxic and trophic changes in various organs and tissues.

The oral mucosa and periodontal tissues are highly sensitive to microcirculatory disturbances due to their well-developed vascular network and intense metabolic activity. In arterial hypertension, impaired regional blood supply leads to a reduction in the regenerative capacity of the epithelium, altered vascular reactivity, and increased vulnerability of tissues to mechanical and microbial factors. Clinically, these changes may manifest as dryness of the oral mucosa, alterations in its color and elasticity, and a tendency toward inflammatory processes.

Under conditions of chronic vascular dysfunction, periodontal tissues respond with the development of inflammatory and dystrophic changes accompanied by increased gingival bleeding, instability of the microcirculatory bed, and a tendency toward progression of chronic periodontitis. Long-term antihypertensive therapy plays a significant role in the development of these disorders, as it may induce hyposalivation and reduce the protective properties of oral fluid, thereby aggravating the course of dental pathology.

Despite existing evidence linking arterial hypertension to target organ damage, the dental manifestations of this condition remain insufficiently studied and are often underestimated in clinical practice. In this regard, investigation of the condition of the oral mucosa and periodontal tissues in patients with arterial hypertension represents a relevant task of modern

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dentistry and is of considerable importance for the development of a comprehensive interdisciplinary approach to the management of this category of patients.

Materials and Methods

The present study was conducted as a clinical observational comparative investigation aimed at assessing the condition of the oral mucosa and periodontal tissues in patients with arterial hypertension. The study was carried out at a dental institution in compliance with the principles of clinical medicine and bioethics.

Patients with a confirmed diagnosis of stage I–II arterial hypertension, verified by medical records and observation by a general practitioner or cardiologist, were included in the study. Inclusion criteria were age between 45 and 60 years, duration of arterial hypertension of at least three years, and stable general health status at the time of dental examination. Exclusion criteria included decompensated somatic diseases, decompensated diabetes mellitus, systemic connective tissue diseases, oncological pathology, as well as the use of hormonal or cytostatic therapy that could affect the condition of oral tissues.

A total of 25 individuals were examined and divided into two groups. The main group consisted of 15 patients with arterial hypertension of varying duration. The control group included 10 individuals without cardiovascular pathology, matched by age and sex, with no history of chronic systemic diseases capable of influencing the condition of the oral mucosa and periodontal tissues. This distribution allowed for an appropriate comparative clinical analysis.

All participants underwent a comprehensive dental examination, including medical history taking, analysis of complaints, and objective examination of the oral cavity. Medical history assessment included duration of arterial hypertension, average blood pressure values, type and duration of antihypertensive therapy, as well as subjective oral complaints such as dryness, gingival bleeding, and discomfort during food intake.

The condition of the oral mucosa was evaluated clinically with consideration of its color, degree of moisture, prominence of the vascular pattern, and the presence of atrophic, traumatic, or inflammatory changes.

Particular attention was paid to signs of xerostomia, decreased tissue turgor, susceptibility of the mucosa to microtrauma, and the rate of epithelialization of superficial defects.

Periodontal tissue status was assessed using generally accepted clinical and index-based methods. The papillary–marginal–alveolar index (PMA) was used for quantitative assessment of inflammatory changes and determination of the extent of the inflammatory process. The sulcus bleeding index (SBI) was applied to evaluate vascular response and capillary permeability. Oral hygiene status was assessed using the simplified oral hygiene index (OHI-S) according to Greene and Vermillion. The community periodontal index (CPI/CPITN) was used to assess the need for periodontal treatment.

Additionally, salivary flow was clinically evaluated based on subjective patient complaints and objective signs of hyposalivation, including decreased salivary volume, changes in consistency, and increased viscosity. The obtained data were analyzed in relation to the type of antihypertensive therapy, which made it possible to assess the influence of pharmacological factors on the condition of the oral cavity.

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Statistical analysis of the study results was performed using methods of descriptive and variational statistics. The Student's t-test was applied to assess the significance of differences between the main and control groups. Correlation analysis was used to identify relationships between the duration of arterial hypertension, treatment characteristics, and the severity of dental changes. The level of statistical significance was set at $p < 0.05$.

Results

The study included 25 patients, of whom 15 individuals with a confirmed diagnosis of stage I–II arterial hypertension constituted the main group, while 10 age- and sex-matched individuals without cardiovascular pathology formed the control group. Analysis of the clinical data revealed statistically significant differences in the condition of the oral mucosa and periodontal tissues between the studied groups.

In patients with arterial hypertension, disorders of the oral mucosa were observed significantly more frequently than in the control group. Clinical signs of xerostomia were recorded in 6 patients of the main group, accounting for 40.0%, whereas similar manifestations were noted in only 2 patients in the control group (20.0%). Reduced moisture of the oral mucosa was accompanied by changes in its appearance: pallor and attenuation of the vascular pattern were observed in 5 hypertensive patients (33.3%), focal atrophic changes in 3 patients (20.0%), and increased susceptibility of the mucosa to microtrauma in 2 patients (13.3%). In the control group, these alterations were sporadic and did not exceed 10% of observations.

Analysis of the relationship between clinical manifestations and the duration of arterial hypertension demonstrated that in patients with a disease duration of more than five years, the prevalence of xerostomia reached 50.0%, whereas in those with a disease duration of less than five years this indicator was 25.0%, indicating progression of trophic disturbances with increasing disease duration.

Assessment of periodontal tissue status in patients with arterial hypertension revealed more pronounced inflammatory changes compared with the control group. The mean sulcus bleeding index (SBI) value in the main group was 2.0 ± 0.3, whereas in the control group it was 1.1 ± 0.2 ($p < 0.05$). The papillary–marginal–alveolar (PMA) index in hypertensive patients reached $45.6 \pm 4.8\%$, which was significantly higher than the corresponding value in the control group ($24.2 \pm 3.9\%$, $p < 0.05$).

Analysis of the community periodontal index (CPI/CPITN) showed that findings corresponding to the need for periodontal treatment (codes ≥ 2) were detected in 9 patients of the main group (60.0%), while in the control group this figure was 20.0% (2 patients). Initial signs of destructive periodontal changes were observed in 5 patients with arterial hypertension (33.3%) and in only 1 patient in the control group (10.0%).

Comparative analysis of the oral hygiene index (OHI-S) did not reveal statistically significant differences between the groups: the mean index value was 1.8 ± 0.4 in the main group and 1.6 ± 0.3 in the control group ($p > 0.05$), which allows inadequate oral hygiene to be excluded as a leading factor in the development of the observed inflammatory changes.

Additional analysis of the influence of antihypertensive therapy demonstrated that among patients receiving long-term diuretic and calcium channel blocker therapy ($n = 7$), clinical signs

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of xerostomia were identified in 57.1% of cases, whereas in patients treated with angiotensin-converting enzyme inhibitors and angiotensin II receptor blockers (n = 8), this indicator was 25.0%. SBI and PMA values in the former subgroup were higher on average by 15–20%, indicating a modifying effect of pharmacological therapy on the condition of the oral mucosa and periodontal tissues.

Thus, the obtained results indicate that arterial hypertension is associated with a statistically significant increase in the frequency of trophic changes of the oral mucosa and inflammatory periodontal diseases. The identified differences are statistically significant, correlate with disease duration and the characteristics of antihypertensive therapy, and are independent of the level of oral hygiene.

Discussion

The obtained results confirm that arterial hypertension exerts a direct effect on the condition of the oral mucosa and periodontal tissues through systemic vascular disorders. The absence of statistically significant differences in the oral hygiene index between the main and control groups allows local factors to be excluded and indicates the leading role of microcirculatory dysfunction in the development of the observed changes.

The increased prevalence of xerostomia in patients with arterial hypertension indicates impaired secretory function of the salivary glands, associated with reduced tissue perfusion and altered vascular regulation. A decrease in salivary volume and changes in its properties lead to weakening of local protective mechanisms, creating conditions for the maintenance of chronic inflammatory processes in periodontal tissues.

Trophic changes of the oral mucosa identified in patients of the main group reflect chronic tissue hypoxia and a reduction in regenerative potential. The more pronounced nature of these disturbances with increasing duration of arterial hypertension indicates a progressive course of microcirculatory disorders and limited compensatory capacity of tissues under prolonged exposure to a systemic vascular factor.

Elevated SBI and PMA index values in patients with arterial hypertension confirm the presence of vascular instability and increased capillary permeability, which contributes to the development and chronification of inflammatory processes in the periodontium. The high frequency of the need for periodontal treatment in this patient group indicates the clinical significance of the identified changes and their impact on periodontal prognosis.

More pronounced dental changes in patients receiving diuretics and calcium channel blockers indicate a modifying effect of antihypertensive therapy. Enhanced tissue dehydration and reduced salivary secretion associated with pharmacological treatment exacerbate existing microcirculatory disorders and should be taken into account during dental follow-up of patients with arterial hypertension.

Thus, the identified changes in the oral mucosa and periodontal tissues in arterial hypertension are caused by systemic vascular dysfunction and have a consistent, non-random nature. The obtained data confirm the need for a comprehensive assessment of dental status in patients with arterial hypertension and justify the inclusion of dental measures in an interdisciplinary monitoring system for this category of patients.

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Conclusion

The results of the present study demonstrate that arterial hypertension is accompanied by the development of pronounced functional and trophic disorders in the tissues of the oral cavity. Changes in the oral mucosa and periodontal tissues in patients with this condition are systemic in nature and are associated with disturbances of microcirculation and vascular regulation characteristic of chronic elevation of arterial blood pressure.

It has been shown that arterial hypertension creates conditions that reduce the resistance of oral tissues to inflammatory influences and limit their reparative capacity. This contributes to the earlier onset and progression of inflammatory periodontal diseases, regardless of the level of oral hygiene.

The established relationship between the severity of dental changes, the duration of arterial hypertension, and the characteristics of antihypertensive therapy indicates the decisive role of systemic factors in the development of pathological processes in oral tissues. The obtained data confirm that the condition of the oral mucosa and periodontal tissues may reflect the degree of vascular impairment in arterial hypertension.

Thus, the results of the study emphasize the necessity of a comprehensive approach to the assessment of dental status in patients with arterial hypertension and substantiate the feasibility of incorporating dental measures into the system of prevention and long-term monitoring of this patient population.

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