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Improving the Effectiveness of Periodontitis Treatment in Patients With Metabolic Syndrome

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Abstract: Metabolic syndrome (MS) represents a complex of metabolic disorders including insulin resistance, obesity, arterial hypertension, and dyslipidemia. In recent decades, there has been an increase in the number of patients with this pathology, which is associated with lifestyle changes, improper nutrition, and decreased physical activity. In patients with metabolic syndrome, the risk of developing chronic inflammatory diseases, including periodontitis, significantly increases.

Keywords: improved effectiveness, periodontitis, metabolic syndrome

Introduction. Chronic periodontitis in such patients is characterized by more pronounced inflammation, increased gingival bleeding, enhanced bone resorption, and difficulty in achieving stable remissions. This is explained by impaired microcirculation, oxidative stress, and systemic inflammation characteristic of MS.

Periodontitis is one of the most common dental diseases, affecting up to 90% of the adult population in various forms of manifestation. According to the World Health Organization, severe forms of periodontitis occur in 10-15% of the world's population, making this pathology a serious medical and social problem of modern times.

Simultaneously, there is a steady increase in the prevalence of metabolic syndrome, which is diagnosed in 20-40% of the adult population in developed countries. Metabolic syndrome represents a complex of interrelated disorders of carbohydrate and fat metabolism, mechanisms of blood pressure regulation and endothelial function, based on decreased tissue sensitivity to insulin.

In recent years, convincing data have been accumulated on the existence of a bidirectional relationship between inflammatory periodontal diseases and metabolic syndrome. Chronic inflammation in periodontal tissues contributes to the aggravation of insulin resistance and lipid metabolism disorders, while metabolic disorders create an unfavorable background for the development and progression of periodontitis.

Current research demonstrates that patients with metabolic syndrome have a more severe course of periodontitis, characterized by increased rate of alveolar bone destruction, delayed repair processes, and high frequency of relapses after treatment (Genco R.J. et al., 2020; Merchant A.T., 2019).

It has been established that hyperglycemia leads to the accumulation of advanced glycation end products in periodontal tissues, which contributes to impaired microcirculation and decreased local immunity. Dyslipidemia and arterial hypertension aggravate microcirculatory disorders, creating conditions for the persistence of the inflammatory process (Chapple I.L.C. et al., 2018).

However, despite understanding the pathogenetic mechanisms of the relationship between periodontitis and metabolic syndrome, existing treatment protocols do not fully account for the features of inflammatory processes in the periodontium against the background of metabolic disorders. Standard methods of periodontal treatment in this category of patients are often characterized by insufficient effectiveness and high frequency of relapses.

The aim of this study is to evaluate the effectiveness of a comprehensive approach to treating chronic periodontitis in patients with metabolic syndrome, including not only standard dental methods but also measures to correct metabolic disorders.

Materials and Methods. The study involved 60 patients aged 40 to 65 years suffering from chronic generalized periodontitis of moderate and severe degree. Among them were 32 men and 28 women. All patients had diagnosed metabolic syndrome, which was determined according to the criteria of the International Diabetes Federation (IDF).

Patients were divided into two groups of 30 people each:

Group 1 (control) – received standard dental treatment for periodontitis.

Group 2 (main) – in addition to standard treatment, patients were prescribed measures to correct metabolic disorders, including diet therapy, physical activity, and drug treatment (hypolipidemic drugs, antioxidants, omega-3 PUFAs).

Clinical examination: included assessment of the bleeding index (PMA), periodontal pocket depth, hygiene index (CPI), and PMA index.

Biochemical blood analysis: determined levels of C-reactive protein (CRP), glucose, lipid profile, and markers of oxidative stress (malondialdehyde).

Radiological examination: orthopantomography was performed to assess bone resorption.

Treatment lasted 3 months, after which repeated evaluation of clinical and laboratory parameters was conducted.

Results. After 3 months of treatment, patients in the main group showed significant improvement in periodontal condition compared to the control group.

The PMA index decreased from 58.2% to 23.4% in the main group, while in the control group it decreased only to 34.7%.

The average depth of periodontal pockets decreased by 1.9 mm in the main group, while in the control group this indicator was 1.2 mm.

The hygiene index (CPI) improved by 60% in the main group versus 40% in the control group.

In 83% of patients in the main group, gingival bleeding completely disappeared, while in the control group this indicator was 62%.

Biochemical Parameters

In the main group, there was a more pronounced reduction in systemic inflammation and improvement in metabolic processes:

- C-reactive protein level decreased by 43% in the main group versus 25% in the control group.
- Lipid profile improved: total cholesterol level decreased by 18%, triglycerides by 22%.
- Fasting blood glucose levels decreased by 15% in patients of the main group.

Thus, the comprehensive approach led to improvement not only in dental but also in systemic health indicators of patients.

The study results confirm that patients with metabolic syndrome have more pronounced periodontal inflammation, which requires a special approach to treatment. Including in therapy not only dental procedures but also correction of metabolic disorders allows achieving significant reduction in inflammation and improvement in periodontal tissue condition. The anti-inflammatory action of omega-3 PUFAs and antioxidants manifested in decreased CRP levels and improved clinical picture. Improvement of lipid profile and reduction of glycemia contributed to decreased systemic inflammation, which positively affected periodontal condition.

Thus, inclusion of systemic anti-inflammatory and metabolic therapy in comprehensive periodontitis treatment in patients with MS is pathogenetically justified and effective.

Conclusions

1. Patients with metabolic syndrome have a more severe course of chronic periodontitis, which requires a comprehensive approach to treatment.
2. Including correction of metabolic disorders (diet, physical activity, hypolipidemic and antihypertensive therapy) in therapy contributes to reduction of systemic inflammation.
3. The use of omega-3 PUFAs and antioxidants increases treatment effectiveness through modulation of inflammatory response and improvement of tissue regeneration.
4. A comprehensive approach to treatment allows significant improvement of clinical and biochemical indicators of periodontal condition and improves patients' quality of life.
5. Development of individual management programs for patients with MS and periodontitis is a promising direction of modern dentistry.

Thus, periodontitis therapy in patients with metabolic syndrome should include not only local treatment but also correction of systemic metabolic disorders, which will allow achieving stable remission and improve the overall health condition of patients.

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