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Improvement of the Effectiveness of Surgical Treatment of Patients with Generalized Periodontitis and Osteopenia

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Keywords:

generalized periodontitis; osteopenia; osteoplastic material; antiresorptive drug

Abstract.

The issue of surgical treatment of patients with generalized periodontitis and osteopenia is particularly topical. Numerous studies have confirmed the benefits of surgical treatment procedures using osteoplastic material to stimulate repair process of periodontal tissues. The objective of the research was to improve the effectiveness of surgical treatment of patients with generalized periodontitis and osteopenia through the combined use of osteoplastic material and antiresorptive drugs in the preoperative and postoperative periods.

80 patients underwent treatment and clinical observation. The patients were divided into 3 groups. Group I included 20 patients who underwent surgical treatment according to conventional procedure. Group II included 20 patients who underwent surgical treatment with local application of osteoplastic material "Easy Graft". Surgical treatment in Group III (20 patients) was conducted using osteoplastic material "Easy Graft" and antiresorptive drug "Bonviva". Experimental group consisted of 20 apparently healthy individuals. The obtained results indicated that surgical treatment with the use of osteoplastic material and antiresorptive drugs promoted the most significant positive effect which was determined according to the dynamics of clinical scores. The combined use of osteoplastic material "Easy Graft" and antiresorptive drug "Bonviva" leads to stable process stabilization being confirmed by clinical study indices both in early and in remote postoperative period.



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Problem statement and analysis of the recent research

Generalized periodontitis (GP) is a common disease. Its frequency increases with age and is characterized by inflammatory and resorption and destructive processes in the patient's periodontal tissues [1-3]. Microorganisms play a special part among numerous factors causing GP [4-6]. Periodontopathogenic microflora species damage periodontal tissue and promote cytokines secretion. They cause increased permeability of blood vessels in tissues, hyperemia, antioxidant defense disorder and other metabolic changes characteristic of inflammatory reactions [7-9]. Periodontopathogenic microflora (*Actinobacillus actinomycetem comitans*, *Prevotella intermedia*, *Porphyromonas gingivalis*, *Treponema denticola*, *Tanarella forsythia*) is considered to be the main etiological factor in the development of inflammatory periodontal diseases [10-12]. Surgical treatment approach is an integral part of GP comprehensive treatment. Surgical treatment of periodontal disease is the most effective method to obtain stable positive results [13-15].

Periodontal surgeries as such do not provide sufficient conditions for the elimination of the pathological process in the bone structures of jaw bones because bone mineral density and features of bone metabolism in people of different age and sex is not taken into account [16-17]. Numerous studies have confirmed the benefits of surgical treatment procedures using osteoplastic material to stimulate repair process of periodontal tissues [18-20].

The objective of the research was to improve the effectiveness of surgical treatment of patients with generalized periodontitis and osteopenia through the combined use of osteoplastic material and antiresorptive drugs in the preoperative and postoperative periods.

Materials and methods of the research

80 patients at the age of 24 to 65 were examined, treated and underwent clinical observation during the research. Depending on the treatment, all patients with GP and osteopenia were divided into three groups, randomized by age, gender and disease duration. Patients with somatic diseases in the decompensation stage, malignant neoplasms, decompensated diabetes, and infectious diseases were excluded from the research. Patients were divided into three groups. Group I included 20 patients with GP and osteopenia who underwent surgical treatment according to conventional procedure. Group II included 20 patients with GP and osteopenia who underwent surgical treatment with local application of osteoplastic material "Easy Graft". Surgical treatment in Group III (20 patients with GP and osteopenia) was conducted using osteoplastic material "Easy Graft" and antiresorptive drug "Bonviva". Experimental group consisted of 20 apparently healthy individuals.

All patients with GP and osteopenia underwent classical Cieszyński-Widmann-Neumann surgery for the periodontium of the appropriate jaw. Mouth cavity was irrigated with antiseptic solutions and anesthesia was performed with Sol. Ubistesini 4%. Two vertical incisions from the gingival margin to transitory fold of the pathological process and horizontal incisions along the gingival margin from labial and lingual (palatal) sides were performed. Modified gingival margins with the width of about 2mm were cut with scissors. Granulation tissue, dental plaque was removed. Bone edge was treated and tooth root was polished. Bone cavities were filled with "Easy Graft" material. "Easy Graft" hardened and acquired a shape of monolithic implant, but a porous one when combined with oral fluids. Mucoperiosteal flap was mobilized, cast in place, and stitched in the interdental spaces. Antiresorptive drug "Bonviva" and background drug therapy, namely Azithromycin- Astrapharm 500 mg in a dose of 1 capsule during 3 days (course dose of 1.5 g), Loratadine in a dose of 1 tablet (10 mg) once a day during 10 days and Laktovit Forte in a dose of 1 capsule 2 times a day during 10 days.

All patients of Group I who were treated with background drug therapy underwent classical Cieszyński-Widmann-Neumann surgery for the periodontium of the appropriate jaw, namely 18

surgeries on the lower jaw and 2 surgeries on the upper jaw. One surgery was performed in 18 (90.0%) patients, two surgeries were performed in 1 (10.0%) patient.

All patients of Group II who were treated with background drug therapy using osteoplastic material "Easy Graft" in the comprehensive treatment underwent classical Cieszyński-Widmann-Neumann surgery for the periodontium of the appropriate jaw, namely 16 surgeries on the lower jaw and 4 surgeries on the upper jaw. One surgery was performed in 16 (80.0%) patients, two surgeries were performed in 2 (20.0%) patients.

All patients of Group III who were treated with background drug therapy using osteoplastic material and antiresorptive drug underwent classical Cieszyński-Widmann-Neumann surgery for the periodontium of the appropriate jaw, namely 16 surgeries on the lower jaw and 4 surgeries on the upper jaw. One surgery was performed in 16 (80.0%) patients, two surgeries were performed in 2 (20.0%) patients.

Hygiene index according to Fedorov-Volodkina, Schiller-Pisarev test modified by D. Svrakov, Muhlemann bleeding index, Ramfjord Plaque Index were used to assess the dynamics of the disease and treatment effectiveness. Clinical research was analyzed before the operation, on the first, second, third, fourteenth day after the operation and in 6 months after the surgery.

During the statistical analysis of the results all the calculations were performed according to variation statistics method with the use of STATISTICA, the application package of computer program of medical and statistical calculations.

Results of the research and their discussion

Symptomatic gingivitis, periodontal pockets, traumatical occlusion were the main aggregate of GP symptoms in the examined patients with GP and osteopenia. The severity of these symptoms depended on the severity of the process. GP of II degree with osteopenia was diagnosed in 27 (45.0%) patients, GP of III degree with osteopenia was diagnosed in 33 (55.0%) patients.

Chronic symptomatic gingivitis (catarrhal, hypertrophic, atrophic) was observed in examined patients with chronic GP and osteopenia. Symptomatic catarrhal gingivitis was observed in 47 (78.57%) patients. Interdental papillae were swollen, hyperaemic with cyanotic discoloration, bled when palpated. Symptomatic hypertrophic gingivitis was observed in 12 (20%) patients, its granulated form was detected in 5 (9.28%) patients and fibrous one was found in 6 (10.71%) patients. In case of granulated form, interdental papillae were swollen, painful, and bled at mechanical irritation. In case of fibrous form gums were unpainful, rose pink, did not bleed in palpation. Atrophic gingivitis was found in 1 (1.43%) patient. Patients with the disease of II and III degree complained of gums bleeding and swelling, itchy and sore gums, teeth loosening. However, clinical aspect of the disease was more significant in patients with GP of III degree and osteopenia.

Bleeding gums were detected in patients with GP of III degree and osteopenia by 13.56 % of cases more frequently than in patients with GP of II degree and osteopenia, as well as gums swelling by 5.34%, itchy gums by 29.01%, painful gums by 18.04%, teeth loosening by 14.43% of cases, respectively.

According to the results of the research, hygiene index according to Fedorov-Volodkina was higher in patients with GP of III degree and osteopenia by 46.50 % ($p < 0.05$) than in patients with GP of II degree. Schiller-Pisarev test modified by D. Svrakov was higher by 12.82% ($p < 0.05$), Ramfjord Plaque Index was higher by 10.40% ($p < 0.05$), Muhlemann bleeding index was higher by 15.06 % ($p < 0.05$) in patients with GP of III degree than in patients with GP of II degree. We consider the observed dynamics of the index assessment indices to indicate more significant disorders in the periodontal tissues in patients with GP of III degree and osteopenia, higher activity of resorption processes in the jaw bony tissue and greater intensity and prevalence of inflammation in periodontal tissues.

However, index assessment indices in patients with GP of II degree and osteopenia were also quite high in comparison with healthy individuals.

Thus, the results of general clinical research revealed significant changes in periodontal tissues in patients with GP and osteopenia which grew with the increase in disease severity. Greater intensity and prevalence of inflammation in periodontal tissues was detected in patients with GP of III degree and osteopenia.

General weakness, ailment, headache, temperature rise from 37.5°C to 38.7°C, slight swelling topically, moderate pain of soft tissues were observed in the patients of all three groups on the first day after the surgery.

On the second day after the surgery temperature rise from 36.9°C to 37.6 °C, facial soft tissues swelling, general weakness and ailment were detected in all patients of Group I. On the second day after the surgery 13 (65.0%) patients of Group II complained of temperature rise from 36.9°C to 37.6 °C and facial soft tissues swelling; all patients complained of general weakness and ailment. On the second day after the surgery temperature rise from 36.9°C to 37.6 °C, facial soft tissues swelling was observed in 10 (50.0%) patients of Group III; all patients complained of general weakness and ailment.

On the third day 18 (90.0%) patients of Group I complained of mild gingival pain in palpation; mild swelling of transitory fold was detected in 8 (40.0%) patients. The maximum number of surgery wound healing by first intention in patients of Group was observed on the 9th-11th days. On the third day 12 (55.0%) patients of Group II complained of mild gingival pain in palpation; mild swelling of transitory fold was found in 4 (20.0%) patients. The maximum number of surgery wound healing by first intention occurred on the 7th-9th days, i.e. 2 days earlier than in the patients of Group I. On the third day 8 (37.50%) patients of Group III complained of mild gingival pain in palpation; mild swelling of transitory fold was detected in 9 (7.50%) patients. The maximum number of surgery wound healing by first intention was observed on the 6th-8th day. Stitches were removed on average on the (7.06±0.23) day in the patients of Group III, i.e. 2-3 days earlier than in patients of Group I and one day earlier than in patients of Group II.

All operated patients of Group I were in satisfactory condition on the 14th-15th day. Gums were pale pink, did not bleed, tightly covered tooth necks with decreased loosening. Operative wound pyogenesis and postoperative bleeding were not observed. Stitches were removed on the 10.24±1.36 day on average in the patients of Group I. All operated patients of Group II were in satisfactory condition. Gums were pale pink, did not bleed, tightly covered tooth necks with decreased loosening. Operative wound pyogenesis and postoperative bleeding were not observed. Stitches were removed on the 8.09±0.64 day on average in the patients of Group II. All operated patients of Group I were in satisfactory condition. Gums were pale pink, did not bleed, tightly covered tooth necks with decreased loosening. Operative wound pyogenesis and postoperative bleeding were not observed.

The results of the surgery were evaluated in 6 months after the surgery. The results of clinical research of periodontal tissues state clearly demonstrated the effectiveness of osteoplastic material "Easy Graft" and antiresorptive drug "Bonviva" application.

Gums bleeding, gingival edema, itchy gums, painful gums, teeth loosening was not observed in patients with GP and osteopenia in all three groups in 6 months after the surgical treatment.

After surgical treatment index assessment of periodontal tissues in patients of Group I was conducted detecting their positive dynamics. In 6 months after the surgery hygiene index according to Fedorov-Volodkina decreased by 23.24% ($p<0.05$) in patients of Group I in comparison with the initial level before the operation; Ramfjord Plaque Index decreased by 32.44% ($p<0.05$); gingival bleeding index decreased by 12.35% ($p<0.05$); Schiller-Pisarev test modified by D. Svrakov was lower by 28.92% ($p<0.05$).

After surgical treatment index assessment of periodontal tissues in patients of Group II was conducted detecting their positive dynamics. In 6 months after the surgery hygiene index according

to Fedorov-Volodkina decreased by 47.28% ($p < 0.05$) in comparison with the data before the operation; Ramfjord Plaque Index was lower by 61.23% ($p < 0.05$); gingival bleeding index decreased by 35.78% ($p < 0.05$); Schiller-Pisarev test modified by D. Svrakov was lower by 64.45% ($p < 0.05$).

Hygienic condition of the oral cavity remained significantly better during this period in comparison with that before the surgery. In 6 months after the surgery, hygiene index according to Fedorov-Volodkina improved by 25.97% ($p < 0.05$), Ramfjord Plaque Index improved by 28.64% ($p < 0.05$), gingival bleeding index improved by 30.54% ($p < 0.05$), Schiller-Pisarev test modified by D. Svrakov improved by 39.83% ($p < 0.05$) in patients of Group II in comparison with patients of Group I. This indicates higher efficiency of surgical treatment with the use of osteoplastic material "Easy Graft".

After surgical treatment index assessment of periodontal tissues in patients of Group III was conducted detecting their positive dynamics. In 6 months after the surgery hygiene index according to Fedorov-Volodkina improved in 11.33 times ($p < 0.05$) in comparison with the data before the operation; Ramfjord Plaque Index improved in 5.08 times ($p < 0.05$); Muhlemann gingival bleeding index improved in 12.75 times ($p < 0.05$); Schiller-Pisarev test modified by D. Svrakov improved in 4.26 times ($p < 0.05$), i.e. hygienic condition of the oral cavity remained at the level achieved after the surgery. Hygienic condition of the oral cavity in the patients of Group III 6 months after surgery was better than that of patients in Group I at the corresponding time, as hygiene index according to Fedorov-Volodkina improved in 9.58 times ($p < 0.05$), Ramfjord Plaque Index improved in 5.35 times ($p < 0.05$); Muhlemann gingival bleeding index improved in 13.29 times ($p < 0.05$); Schiller-Pisarev test modified by D. Svrakov improved in 4.27 times ($p < 0.05$).

However, compared to the periodontal tissues indices in patients with GP and osteopenia before the treatment, indices in the patients of Group III remained the best in comparison with the same one in the patients of Groups I and II in all periods after treatment (Fig. 1, Fig. 2, Fig. 3).

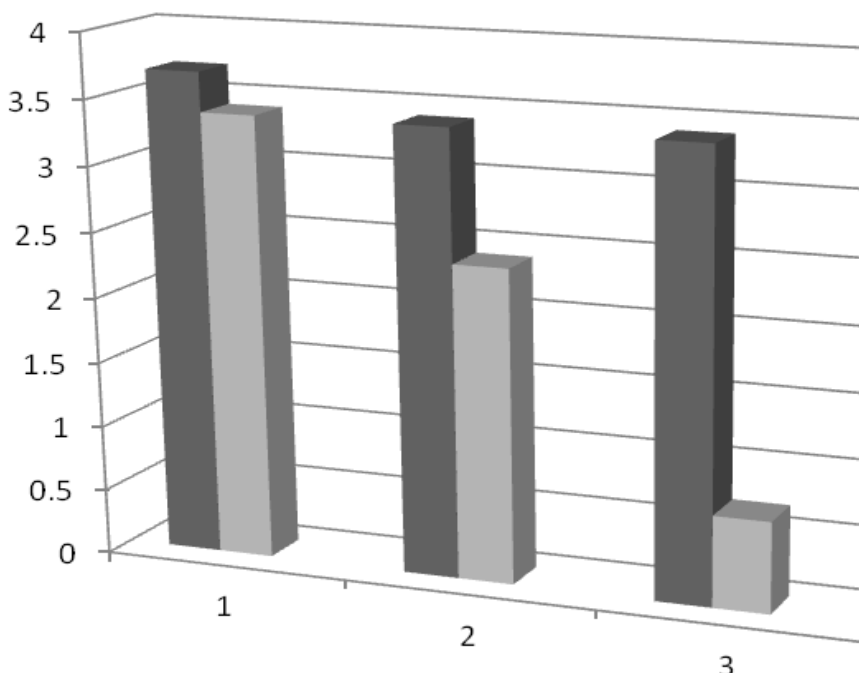


Fig. 1. Dynamics of hygiene index according to Fedorov-Volodkina in the patients with generalized periodontitis and osteopenia under the influence of various treatment regimens: 1 - Group I; 2 - Group II; 3 - Group III;

■ - before the treatment; ■ - in 6 months after the treatment * - probability of difference from Group III.

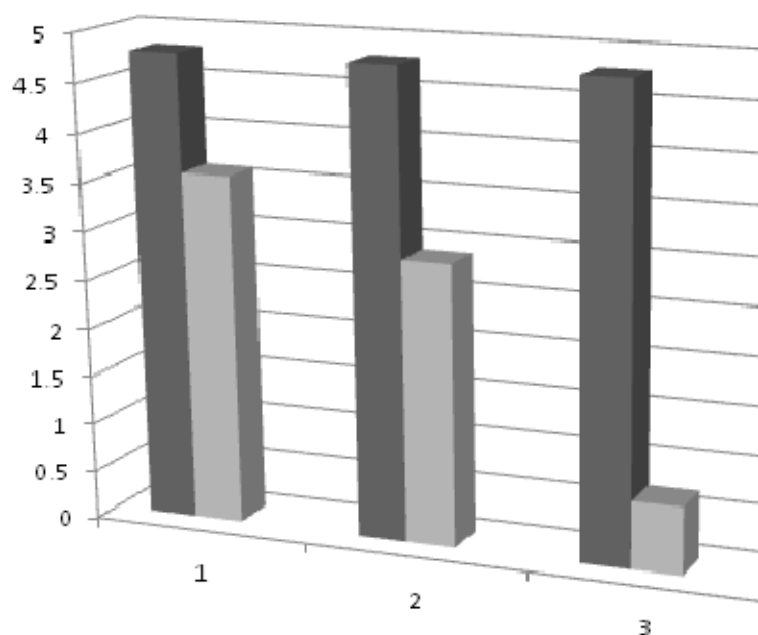


Fig. 2. Dynamics of Ramfjord Plaque Index in the patients with generalized periodontitis and osteopenia under the influence of various treatment regimens: 1 - Group I; 2 – Group II; 3 – Group III;

■ - before the treatment; ■ - in 6 months after the treatment * - probability of difference from Group III.

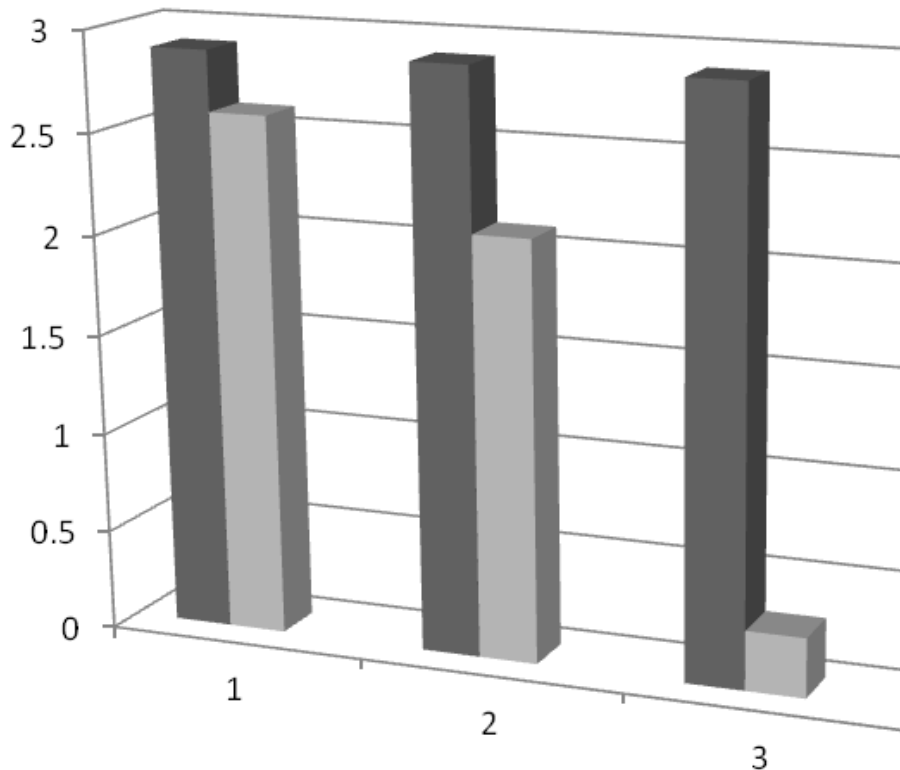


Fig. 3. Dynamics of Muhlemann gingival bleeding index in the patients with generalized periodontitis and osteopenia under the influence of various treatment regimens: 1 - Group I; 2 – Group II; 3 – Group III;

■ - before the treatment; ■ - in 6 months after the treatment * - probability of difference from Group III.

According to the results of the research hygiene index according to Fedorov-Volodkina was higher by 48.50% ($p < 0.05$) in patients with GP of III degree and osteopenia in comparison with patients with GP of II degree and osteopenia; Ramfjord Plaque Index was higher by 11.30% ($p < 0.05$), gingival bleeding index was higher by 16.06% ($p < 0.05$), indices of Schiller-Pisarev test modified by D. Svrakov were higher by 11.92% ($p < 0.05$). We consider the observed dynamics of the index assessment indices to indicate more significant disorders in the periodontal tissues in patients with GP of III degree and osteopenia, higher activity of resorption processes in the jaw bony tissue and greater intensity and prevalence of inflammation in periodontal tissues. Taking into account the significant changes in periodontal tissues of patients with GP of II and III degree and osteopenia, the initial state of oral hygiene should be considered in predicting the results of surgical treatment of patients with GP and osteopenia. Surgical treatment using osteoplastic material and antiresorptive drug contributed to the most significant positive effect on the changes in the index assessment indices of periodontal tissues in patients with GP.

Conclusions

1. Significant changes in periodontal tissues increasing with the increase in disease severity are peculiar to patients with GP and osteopenia.
2. Positive dynamics of clinical indices was observed in patients with GP and osteopenia after surgery on the background of the backbone therapy in the early postoperative period. Surgery on the background of backbone therapy provides insufficient stabilization of GP clinical manifestations in a remote postoperative period.
3. The use of osteoplastic material "Easy Graft" in the surgical treatment of patients with GP and osteopenia normalizes and to a lesser extent promotes the positive dynamics of clinical indices.
4. Combined use of osteoplastic material "Easy Graft" and antiresorptive drug "Bonviva" leads to stable process stabilization being confirmed by clinical study indices both in early and in remote postoperative period.
5. Regimen of surgical treatment of patients with chronic GP of II and III degree and osteopenia was developed combined with pharmacological therapy increasing the efficiency of surgical treatment and process stabilization, being safe and available in dentist's practice.

Prospect for further research

Taking into account GP high prevalence, the issue of further study of osteoplastic material "Easy Graft" and antiresorptive drug "Bonviva" influence on the clinical manifestations both in early and in remote postoperative period appears.

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