

## MARKERS OF BONE TURNOVER IN THE TREATMENT AND CONTROL OF COMPLEX THERAPY OF GENERALIZED PERIODONTITIS

©I. Gorb-Gavrylchenko

*Dnipro State Medical University*

**SUMMARY.** The search and justification for the use of pathogenetic therapy, differentiated prescription of drugs in accordance with the clinic of periodontitis, dental status and general somatic condition of patients is the main direction of modern periodontology. It is known that one of the main indicators of the effectiveness of treatment of generalized periodontitis is considered to be long-term results after treatment, which provide objective information about quantitative and qualitative changes in clinical and paraclinical signs of the condition of periodontal tissues, allowing one to judge the presence or absence of clinical and radiological stabilization.

**The aim** – to evaluate the effectiveness of treatment of generalized periodontitis in women after oophorectomy based on the state of bone tissue remodeling processes.

**Material and Methods.** Clinical and radiological periodontal tissues and laboratory studies of bone metabolism markers were carried out in 60 women who had undergone oophorectomy and suffered from generalized periodontitis.

**Results.** In the long term after treatment, a decrease in the osteoporosis activity index was observed in all observation groups. Positive dynamics of the osteoporotic process index in the alveolar process meant inhibition of increased resorptive processes and increased osteogenesis. The normalization of bone metabolism was evidenced by a decrease in hydroxyproline levels and an increase in osteocalcin levels in patients of the first and second observation groups.

**Conclusion.** The results of the study confirm the need to identify three forms of activity of the osteoporotic process in the alveolar bone for a further differentiated approach in the complex treatment of generalized periodontitis. For women with inactive foci of osteoporosis in the alveolar process, it is advisable to use Calcium-D3 Nycomed. In the presence of moderately active and active foci of osteoporosis in the bone structures of the periodontium, it is more advisable to prescribe calcium supplements and antiresorptive agents in combination with drugs that normalize hormonal levels. Taking into account the established features, a complex pathogenetically substantiated method of treating generalized periodontitis in this group of patients has been developed and tested. It provides, along with basic therapy, the prescription of Calcium-D3 Nycomed, Fosamax and Proginova.

**KEY WORDS:** generalized periodontitis; treatment; osteoporosis; biochemical markers.

**Introduction.** A decrease or cessation of the function of the gonads in women causes osteoporotic changes in various parts of the skeleton, including the periodontal bone tissue, which, apparently, is one of the reasons for the sharp increase in the incidence of periodontal tissue diseases in this group of patients [1, 2, 3].

A study by M. Tezal and J. Wactawski-Wende (2000), which included 70 women aged 51 to 78 years, revealed a correlation between the amount of sex hormones and alveolar bone mineral density. The authors conclude that postmenopausal osteoporosis is a major risk factor for the development of periodontal disease, and alveolar height loss and the number of teeth lost in postmenopausal women depend on the degree of osteopenia [4].

All of the above is confirmed by our own observations of the high prevalence of periodontal pathology in women with total ovariectomy, and the severity of periodontitis correlated with the duration of surgical menopause [5].

Interest in the use of drugs with antiresorptive and osteotropic effects in medicine has been increasing in recent years [6, 7]. However, clear indications for the use of such drugs have not yet been developed, depending on the state of bone remodeling

processes in a particular patient. Undoubtedly, only a comprehensive study of the level of basic biochemical markers can determine the intensity of bone metabolism [8], and which process prevails (resorption or suppression of bone formation). Only with such information is it possible to develop individual tactics for the treatment of generalized periodontitis in women with excluded ovarian function.

**The aim of the study** – to assess the effectiveness of treatment of generalized periodontitis in women after oophorectomy based on the state of bone tissue remodeling processes.

**Material and Methods.** Clinical, radiological and laboratory examinations were carried out in 60 women (aged 30 to 50 years) who had undergone oophorectomy and suffered from generalized periodontitis.

Clinical examination of patients was carried out according to the generally accepted scheme, including analysis of patient complaints, history taking, examination, and objective data. To objectively assess the condition of periodontal tissues, the parameters of periodontal tests and indices were taken into account: data from the periodontal index according to A. L. Russel (1956), the Schiller-Pisarev digital test, the PMA index, and the gum bleeding index according to H. R. Muhlemain (1971). Periodontal bone tis-

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 sue was assessed using an orthopantomogram using the index of osteoporotic process in the alveolar process (I. S. Mashchenko, A. V. Samoilenko) [9].

We studied the content of osteocalcin and hydroxyproline to assess bone metabolism. A marker of bone tissue resorption, hydroxyproline, was determined by reaction with paradimethylaminobenzaldehyde according to the method of A. A. Krel and L. M. Furtseva. Osteocalcin was determined by radioimmunoassay using a kit from CIS bio international (France). Statistical processing of the results was carried out using Microsoft Excel for Windows XP with the determination of the average and mean error ( $M \pm m$ ), and the calculation of the t-Student criterion. When testing hypotheses, a significance level of  $p < 0.05$  was used. To assess correlation relationships, linear correlation analysis was used to calculate the correlation coefficient ( $r$ ).

The patients were divided into two groups: the first group (28 women) included patients with weakly active osteoporosis foci in the alveolar bone, the second (32 women) – with moderately active and active osteoporosis foci.

The control group consisted of 20 healthy women without clinical and biochemical signs of the inflammatory-destructive process in the periodontium. Previous studies have shown that in women with inactive foci of osteoporosis in the bone structures of the pe-

riodontium (group I), it is advisable to use Calcium-D3 Nycomed. With moderate and high activity of the osteoporotic process in the periodontal bone structures (group II), it is necessary to use a combination of drugs with different mechanisms of action, such a combination was the drugs Calcium-D3 Nycomed, Fosamax and the hormone replacement therapy drug Proginoва [10].

Clinical, radiological and laboratory studies were carried out before the start of treatment, 1 and 3 years after the completed course of treatment.

Control examinations, necessary corrective treatment, and preventive measures were carried out by actively calling patients with generalized periodontitis after 1 and 3 years.

**Results and Discussion.** During the analysis of the results of treatment of generalized periodontitis in women after total oophorectomy, no relapses of the disease were found one year after the treatment.

In the first group of the study, positive clinical results were observed in 26 (92.9 %) women, in the second – in 28 (87.5 %), relapse of the disease was observed in 2 (7.1 %) and 4 (12.5 %), respectively after 3 years treatment.

The most informative indicator of the effectiveness of the treatment is the osteoporotic process index (Fig. 1).

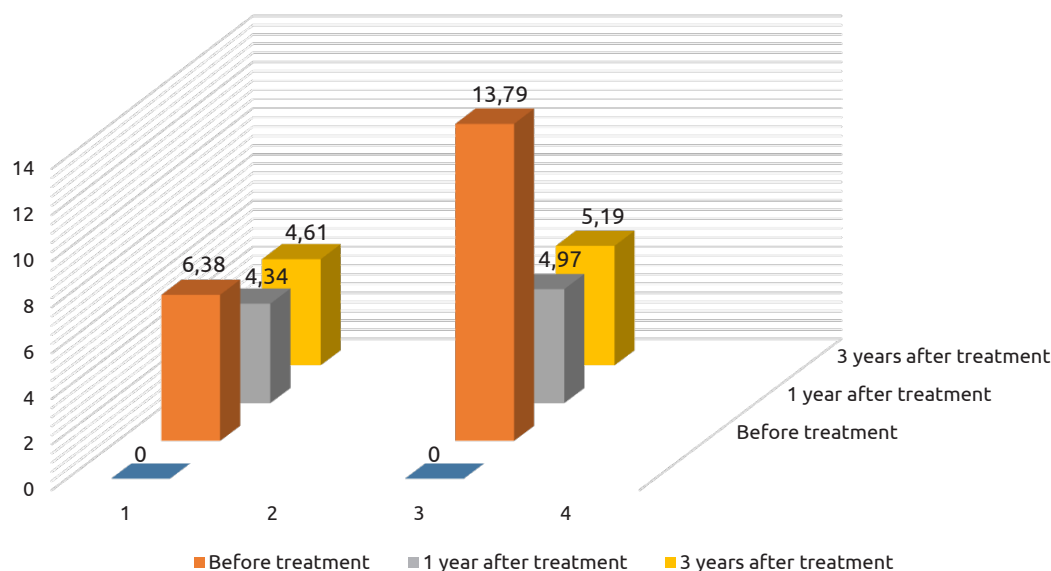


Fig. 1. Dynamics of indicators of the index of the osteoporotic process (in points).

Thus, after 1 year, in patients of the II group, the indicator of this index decreased to  $4.97 \pm 0.14$  points, against  $13.79 \pm 0.17$  points before treatment, after 3 years the index was equal to  $5.19 \pm 0.15$  points. In women of the 1st observation group, after 1 year, the indicator of this index was  $4.34 \pm 0.50$  points, after 3 years –  $4.61 \pm 0.60$  points (Fig. 1).

A decrease in the index of osteoporosis activity in the alveolar process in all observation groups, in the long term after the treatment, indicates an increase in the mineralization of bone structures of the periodontium and stable clinical and X-ray stabilization.

The positive dynamics of the treatment of patients was also confirmed by significant changes in

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bone remodeling indicators. Thus, in the analysis of markers

of bone metabolism, it was found that osteocalcin levels 1 and 3 years after the treatment in patients of the II group, with moderate and high activity of osteoporosis in the interdental alveolar septa, did not change significantly, and corresponded to those in the control group (table 1). In the women of

the first observation group, a year after the treatment, there were no statistically significant changes in osteocalcin levels, and after 3 years, a slight decrease to  $16.7 \pm 1.3$  IU g/l was observed. At the same time, the study of oxyproline indicators indicates a significant decrease in the bone resorption marker in this contingent of patients after the approved treatment complexes (table 1).

Table 1. Dynamics of markers of bone metabolism (M $\pm$ m)

Groups	Term of treatment	Indicators	
		Osteocalcin (IU g/l)	Oxyproline / Cr (mmol/l)
I Group (n = 28)	Before treatment	20.3 $\pm$ 1.1**	0.88 $\pm$ 0.03**
	After 1 year	19.8 $\pm$ 1.2* **	0.53 $\pm$ 0.04* **
	After 3 years	16.7 $\pm$ 1.3* **	0.64 $\pm$ 0.03* **
II Group (n = 32)	Before treatment	14.1 $\pm$ 0.9**	2.42 $\pm$ 0.04**
	After 1 year	20.0 $\pm$ 1.4* **	0.56 $\pm$ 0.01* **
	After 3 years	19.1 $\pm$ 1.1* **	0.68 $\pm$ 0.02* **
Control group (n=20)		20.9 $\pm$ 1.4	0.54 $\pm$ .02

Notes: 1. \*p<0.05 – reliability in relation to indicators before treatment; 2. \*\*p<0.05 – reliability in relation to individuals of the control group; 3. n – is the number of patients in the group.

The positive dynamics of the treatment of patients was also confirmed by significant changes in bone remodeling indicators. Thus, in the analysis of markers of bone metabolism, it was found that osteocalcin levels 1 and 3 years after the treatment in patients of the II group, with moderate and high activity of osteoporosis in the interdental alveolar septa, did not change significantly, and corresponded to those in the control group (table 1). In the women of the first observation group, a year after the treatment, there were no statistically significant changes in osteocalcin levels, and after 3 years, a slight decrease to  $16.7 \pm 1.3$  IU g/l was observed. At the same time, the study of oxyproline indicators indicates a significant decrease in the bone resorption marker in this contingent of patients after the approved treatment complexes (table 1).

One year after treatment, the oxyproline index in women of the II group decreased by 4 times compared to the baseline ( $0.56 \pm 0.01$  mmol/l versus  $2.42 \pm 0.04$  mmol/l, p<0.05), and in the I group by 1.5 times ( $0.53 \pm 0.04$  mmol/l versus  $0.88 \pm 0.03$  mmol/l, p<0.05).

**Conclusions.** The conducted studies confirm the need to identify three forms of activity of the osteoporotic process in the alveolar process in women after total oophorectomy, suffering from generalized periodontitis, in order to develop individual treatment tactics for each group of patients. The research

results indicate the feasibility of a differentiated approach to osteotropic therapy. For women after total oophorectomy with inactive foci of osteoporosis in the alveolar bones, it is sufficiently to prescribe a calcium supplement (Calcium-D3 Nycomed). In the presence of moderately active and active foci of osteoporosis in the bone structures of the periodontium, it is more advisable to prescribe calcium supplements and antiresorptive agents in combination with drugs that normalize hormonal levels. Taking into account the established features, a complex pathogenically substantiated method of treating generalized periodontitis in this group of patients has been developed and tested. It provides, along with basic therapy, the prescription of Calcium-D3 Nycomed, Fosamax and Proginova. Evidence of the effectiveness of treatment is positive changes in bone remodeling markers within 1 year from the start of therapy. The above facts indicate how clinically important it is when prescribing complex methods for the treatment of generalized periodontitis in women after oophorectomy to analyze those changes that are caused by endocrine pathology and have pathogenetic significance in the development of osteoporotic changes in the bone structures of the periodontium. The correct choice of adequate treatment methods for generalized periodontitis is impossible without taking them into account.

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## МАРКЕРИ КІСТКОВОГО ОБМІНУ В ЛІКУВАННІ ТА КОНТРОЛІ КОМПЛЕКСНОЇ ТЕРАПІЇ ГЕНЕРАЛІЗОВАНОГО ПАРОДОНТИТУ

©І. В. Горб-Гаврильченко

Дніпровський державний медичний університет

**РЕЗЮМЕ.** Пошук та обґрунтування застосування засобів патогенетичної терапії, диференційоване призна- чення лікарських засобів відповідно до клініки пародонтиту, стоматологічного статусу та загальносоматичного стану хворих є основним напрямком сучасної пародонтології. Відомо, що одним із основних показників ефектив-

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ності лікування генералізованого пародонтиту є віддалені результати після проведеного лікування, які дають  
об'єктивну інформацію про кількісні та якісні зміни клінічних та параклінічних ознак стану тканин пародонта, до-  
зволяють судити про наявність або відсутність клініко-рентгенологічної стабілізації.

**Мета** – оцінити ефективність лікування генералізованого пародонтиту в жінок після оваріоектомії за станом  
процесів ремоделювання кісткової тканини.

**Матеріал і методи.** Було проведено клініко-рентгенологічне дослідження тканин пародонта та лабораторне  
дослідження маркерів кісткового метаболізму в 60 жінок, що перенесли оваріоектомію та страждають на генера-  
лізований пародонтит.

**Результати.** У віддалені терміни після проведеного лікування спостерігалось зниження індексу активності  
остеопорозу в усіх групах спостереження. Позитивна динаміка індексу остеопорозного процесу в альвеолярному  
відростку означала гальмування підвищених резорбтивних процесів та посилення остеогенезу. Про нормаліза-  
цію кісткового обміну свідчили і зниження показників оксипроліну та підвищення рівнів остеокальцину в пацієн-  
тів першої та другої груп спостереження.

**Висновок.** Результати дослідження підтверджують необхідність виділення трьох форм активності остеопорозного процесу в альвеолярній кістці, для подальшого диференційованого підходу в комплексному лікуванні генералізованого пародонтиту. Жінкам з малоактивними вогнищами остеопорозного процесу в альвеолярному відростку доцільне застосування Кальцій-Д3 Нікомеду. За наявності середньоактивних та активних вогнищ остеопорозу в кісткових структурах пародонта доцільнішим є призначення препаратів кальцію та антирезорбтивних засобів у комплексі з препаратами, які нормалізують гормональний фон. Зважаючи на встановлені особливості розроблено та апробовано комплексний патогенетично обґрунтований метод лікування генералізованого пародонтиту в даного контингенту хворих. Він передбачає, поряд із засобами базової терапії, призначення Кальцій-Д3 Нікомед, Фосамакса та Прогінова.

**КЛЮЧОВІ СЛОВА:** генералізований пародонтит; лікування; остеопороз; біохімічні маркери.

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Електронна адреса для листування: 501@dmu.edu.ua