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MEDICINE AND PHISIOLOGY

APPLICATION OF OSTEOTROPIC THERAPY DEPENDING ON THE ACTIVITY OF THE OSTEOPROPIC PROCESS IN ALVEOLAR BONE

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Annotation. *The bone tissue metabolism, in women after ovariectomy, was study in this work to evaluate the effectiveness of a differentiated approach in the appointment of osteotropic therapy in the treatment of generalized periodontitis in this contingent of patients. The research results confirm the necessity to distinguish three forms of activity of the osteoporotic process in the alveolar bone with the purpose inventions of individual treatment tactics for each group of patients.*

Key words: *generalized periodontitis, ovariectomy, osteotropic therapy, biochemical markers.*

Osteoporotic changes caused by the interruption or subsidence in the function of the gonads in women are observed in various parts of the skeleton, including the periodontal bone tissue, which, apparently, is one of the reasons for the sharp increase in the periodontal disease incidence in this patient population [1,2,3].

Osteoporotic changes in the skeleton effect dental plates as well aggravating destruction of both alveolar bone and parodontium conjunctive tissue [4,5]. Basing upon the accumulated data, American Dental Association considers osteoporosis as a risk factor for the development of inflammatory diseases of parodontium [6].

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 the mineral density of the alveolar bone. The authors conclude, that postmenopausal osteoporosis is a prime risk factor for periodontal disease, and the alveolar resorption and the number of teeth lost by postmenopausal women depends on the degree of osteopenia [7].

In terms of the current stage of clinical stomatology development, it is not difficult to make a diagnosis of parodontium diseases [8]. At the same time, determining the nature of clinical progression, prognosis of the disease development, interconnection with general state of a patient, ratio between changes in parodontal complex and skeletal system in general require further analysis [9].

Our own observations is demonstrate the high prevalence of periodontal pathology in women with total ovariectomy and confirmed all of the above. Besides, the severity of periodontitis correlated with the duration of surgical menopause [10]

The basic tasks in the modern parodontology are to find and substantiate the application of the means of pathogenetic therapy as well as to differentiate the prescription of treatment agents according to the clinical findings of parodontitis, stomatological

status, and general patient status. Dependence of the parodontium issues status upon the hormonal status of patients with surgical menopause determines the necessity to include specific osteoporosis medications into the traditional scheme of generalized parodontitis treatment [11].

The interest in the drugs administration with antiresorptive and osteotropic effects in medicine has been increase in over recent years [12,13]. 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 content of the main biochemical markers not only can determine the intensity of bone metabolism [14], but also which process prevails (resorption or inhibition of bone formation). Only having such information, can it be possible to develop individual tactics for the treatment of generalized periodontitis in women with “turned off” ovarian function.

Objective is estimate efficiency of the treatment of generalized periodontitis in women after ovariectomy by the state of bone remodeling processes.

Objects and methods of the study. A clinical, radiological and laboratory examination was carried out in 60 women, aged 30 to 50 years, who had underwent ovariectomy and suffering from generalized periodontitis. Patients were divided into two groups: the first (I) group (28 women) included patients with low-activity local areas of osteoporosis in the alveolar bone, the second (II) (32 women) - with middling active and active local areas of osteoporosis. The control group consisted of 20 healthy women without clinical and biochemical signs of an inflammatory and destructive process in parodontium.

Control examinations, necessary corrective treatment, preventive services were carried out by active consultation call patients with generalized periodontitis, on the background of surgical menopause, at 3 and 5 years after end of course of treatment. Clinical examination of patients was performed according to the generally accepted scheme which included analysis patient's complaints, medical history, simple examination, results of objective data. The parameters of periodontal indices and tests took into account for an objective assessment of the condition of periodontal tissues: data of the periodontal index A.L. Russel (1956), digital Schiller-Pisarev test, PMA index, gum bleeding index H.R. Muhlemain (1971). Periodontal bone tissue was evaluated by orthopantomograms using the index of the osteoporotic process in the alveolar process (I. Mashchenko, A. Samoilenko) [15].

The level of the main calcitropic hormones: parathyroid hormone and calcitonin; blood ionized calcium levels and biochemical markers (osteocalcin in blood and urinary oxyproline excretion) of bone metabolism were examine for determine the state of processes of bone tissue metabolism. The enzyme multiplied immunoassay, with the aid the kit from CIS bio international (France), was used for assess the parathyroid hormone and calcitonin. Bone tissue resorption marker – oxyproline, was determined by the reaction with paradimethylaminobenzaldehyde according to the method of A. A. Krell and Furtseva L.N. [16]. Osteocalcin was determined by the radioimmunoassay with the

aid the kit from CIS bio international (France). The level of ionized calcium in blood serum was determined using a «Huma-Laser-2000» biochemistry analyzer (Germany) with the aid kits from the Hoospiten Diagnostics company (Switzerland).

Statistic data were processed by means of a computer with the help of Statistica 8.0 (Stat Soft, Inc.), Biostatistics 4.03 (Mc Graw Hill) statistic programs and Excel 2007 (Microsoft, Corp.) electronic tables powered by Windows Vista (Microsoft, Corp.). Differences between the compared values were determined according to the Student criterion and considered to be accurate in terms of critical level of significance of differences (p) being less than 0.05.

Previous researches testify that the use of Calcium-D3 Nycomed is effectually for women with low-activity local areas of osteoporosis in the alveolar bone (group I). Women with middling active and high active of osteoporotic process in the alveolar bone (group II) be in need of to use a combination of pharmaceutical drugs with different mechanisms of action, such a combination was composed of Calcium-D3 Nycomed, Fosamax and hormone replacement therapy drug Proginova [14].

Clinical, radiological and laboratory examinations were performed before treatment, 3 and 5 years after the completed course of treatment.

Control examinations, necessary corrective treatment, preventive services were carried out by active consultation call patients with generalized periodontitis, on the background of surgical menopause, at 3 and 5 years after end of course of treatment.

Research results and their discussion. During the analysis of the results of treatment of generalized periodontitis in women, after total ovariectomy, one year after the treatment, disease recurrence, were not determined. In the first group of the study 3 years after the treatment, positive clinical results were observed in 26 (92.9%) women, in the second group - in 28 (87.5%), the disease recurrence were observed in 2 (7.1%) and 4 (12.5%), respectively.

The index of the osteoporotic process is the most informative indicator of the effectiveness of the treatment (Fig. 1). The index of the osteoporotic process is the most informative indicator of the effectiveness of the performed treatment. So, in patients of group II, at 3 years after end of course of treatment, the measure of this index decreased to 7.44 ± 0.17 score, against 13.64 ± 0.18 score before treatment, and at 5 years after end of course of treatment to 5.11 ± 0.17 score. In women of the first studies group, with clinical and radiological stabilization at 3 years after end of course of treatment, the measure of this index was 4.41 ± 0.50 score, at 5 years after end of course of treatment - 4.55 ± 0.70 score ($p < 0.05$).

The decrease in the activity index of osteoporosis in the alveolar process in all study groups, in the long term after the performed treatment, indicates an increase in the mineralization of the alveolar bone and durable clinical and radiological stabilization (Fig.1).

While analyzing the indicators of markers of bone metabolism, was identified, that the levels of osteocalcin at 3 and 5 years after end of course of treatment in patients group II, with middling and high activity of osteoporosis in the inter alveolar septum, did not essentially varied (osteocalcin: at 3 years - 20.0 ± 1.4 IU g/l, at 5 years - 19.1 ± 1.1

IU g/l), and be in accord with the control group (table .1). In women of the first studies group, in the long term after the treatment, there was observable some decrease in the level of osteocalcin to 17.1 ± 1.2 IU g/l at 3 years and to 16.7 ± 0.8 IU g/l at 5 years after end of course of treatment (table .1).

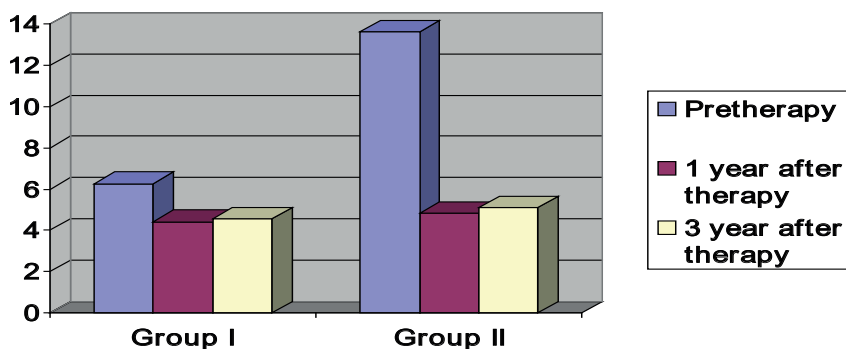


Fig. 1. Dynamics of osteoporosis index (in points)

On the same lines, the study of oxyproline markers indicated accurate about decrease the bone's resorption markers in this group of patients after tested treatment complexes. The oxyproline indicator in women group II decreased by 3 times at 3 years after end of course of treatment, as compared with the initial (0.70 ± 0.02 mmol/l versus 2.40 ± 0.04 mmol/l, $p < 0.05$). The oxyproline indicator in women group I decreased by 1.5 times and was 0.61 ± 0.03 mmol/l versus 0.83 ± 0.03 mmol/l, $p < 0.05$ if untreated (table .1).

Table 1

Changes in measures of markers of bone metabolism ($M \pm m$)

Groups	Treatment duration	Measurements	
		Osteocalcin (IU g/l)	Oxyproline / Cr (mmol/l)
Group I (n = 28)	Pretherapy	$20,1 \pm 1,1^{**}$	$0,83 \pm 0,03^{**}$
	At 1 years	$19,9 \pm 1,2^{***}$	$0,53 \pm 0,04^{***}$
	At 3 years	$17,1 \pm 0,8^{***}$	$0,61 \pm 0,03^{***}$
Group II (n = 32)	Pretherapy	$14,1 \pm 0,9^{**}$	$2,40 \pm 0,04^{**}$
	At 1 years	$20,0 \pm 1,4^{***}$	$0,55 \pm 0,01^{***}$
	At 3 years	$19,1 \pm 1,1^{***}$	$0,70 \pm 0,02^{***}$
$20,9 \pm 1,4$ $0,54 \pm 0,02$		$20,9 \pm 1,4$	$0,54 \pm 0,02$

Notes:

1. $*p < 0,05$ - accuracy in relation to measurements pretherapy;
2. $**p < 0,05$ - accuracy in relation to persons of the control group;
3. n - the number of patients in the group.

The results of study secretion parameters of the main calcium-regulating hormones show the normalization of mineral metabolism. Analysis of the parameters of calcium-tropic hormones showed that results of patients group II were the most approximate to the control group. The level of calcitonin in these patients was 17.8 ± 0.9 pg / ml, parathyroid hormone 17.4 ± 1.3 pg / ml (table .1).

Was present some decrease in measures calcitonin and an increase in measures parathyroid hormone in women group I (table 2).

Table 2

Changes in measures of calciumtropic hormones and ionized calcium (M ± m)

Groups	Treatment duration	Measurements		
		Calcitonin pg / ml	Parathyroid hormone pg / ml	Ionized calcium mmol/l
Group I (n = 28)	Pretherapy	14,1±0,4**	24,9±1,4**	1,04±0,01**
	At 1 years	17,9±0,4***	17,5±1,6***	1,24±0,05***
	At 3 years	16,1±0,8***	18,9±1,2***	1,22±0,05***
Group II (n = 32)	Pretherapy	8,1±0,4**	39,2±0,7**	0,85±0,02**
	At 1 years	18,2±0,3***	16,7±1,5***	1,26 ±0,03***
	At 3 years	17,8±0,9***	17,1±1,3***	1,24 ±0,04***
Control group (n=20)		18,2±0,7	16,9±0,9	1,25 ±0,04

Notes:

1. * $p < 0,05$ - accuracy in relation to measurements pretherapy;
2. ** $p < 0,05$ - accuracy in relation to persons of the control group;
3. n - the number of patients in the group.

Performed complex treatment had favorably an effect on levels of ionized calcium (table. 2).

Conclusions. The biochemical studies of calcium homeostasis, hormonal status, and markers of bone metabolism confirm the need for women, after total ovariectomy and suffering from generalized periodontitis, to give prominence three forms of activity of the osteoporotic process in the alveolar bone, with the purpose of to develop for each group of patients individual treatment tactics. The research results indicate the advisability of a differentiated approach in the institution of osteotropic therapy.

For women after total ovariectomy, with low-activity local areas of osteoporosis in the alveolar bones, a calcium preparation (Calcium D3 Nycomed) is sufficient. In the presence the middling active and active local areas of osteoporosis in the alveolar bone tissue, it is more appropriate to prescribe calcium preparations and antiresorptive agents in combination with drugs that normalize the endocrine profile.

In view of the established features, has been developed and tested the complex pathogenetically substantiated method for the treatment of generalized periodontitis in this group of patients. It provides, along with basic therapy, prescribing Calcium - D3

Nycomed, Fosamax and Proginova. Calcium-D3 Nycomed (a third-generation calcium preparation) increases the level of calcium in the blood, resulting in inhibition of the secretion of parathyroid hormone synthesis, which in turn leads to a decrease in bone resorption. Fosamax has a powerful anti-resistance ability, by reducing the activity of osteoclasts, stimulates the processes of reossification and mineralization of the bone tissue of the alveolar process, contributes to the clinical stabilization of the pathological process in periodontal tissues. Hormone replacement therapy has a protective effect on bone tissue, reducing bone resorption, by normalizing the endocrine profile (in particular, hormones that regulate calcium-phosphorus metabolism). These facts indicate how clinically important it is when prescribing complex methods of treating generalized periodontitis in women after ovariectomy to analyze those changes that are caused by endocrine pathology and have pathogenetic significance in the development of osteoporotic changes in the alveolar bones. The correct choice of adequate treatment methods for generalized periodontitis without taking them into account is impossible.

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