IJIMM, Volume 2, Issue 4, 2024
ISSN: 2995-5319
http://medicaljournals.eu/index.php/IJIMM

INTERNATIONAL JOURNAL OF
INTEGRATIVE AND
MODERN MEDICINE

Studying the Dynamics of Bone Tissue Remodeling in Blood Plasma by Determining the Level of Bone Alkaline Phosphatase in the Blood

Avzal Nigmatullaevich Akbarov
DSc. Professor, Tashkent State Dental Institute, Tashkent, Uzbekistan

Madina Makhirovna Tillakhodjayeva
Researcher, Tashkent State Dental Institute, Tashkent, Uzbekistan

Abstract:

Background: In case of violation of calcium-phosphorus metabolism, alkaline phosphatase is an enzyme that determines the intensity of the course of bone tissue remodeling processes. The quantitative determination of the bone isoenzyme of alkaline phosphatase in serum was determined by the enzyme immunoassay using commercial reagent kits.

Thus, thanks to a comparative assessment of treatment methods, it can be distinguished that the "one two three" complex has a greater efficiency in restoring the components of mineral metabolism in the blood, helps to maintain the necessary level of bone alkaline phosphatase.

Keywords: Osseointegration, postmenopausal osteoporosis, dental implants.

Today, the search for optimal implantation methods, including modification of the implant surface and the development of new surgical methods, is relevant in the issue of successful osseointegration. It should be noted that the emphasis is on studying the influence of various factors on the processes of osseointegration at a deeper level, such as cellular and tissue. Thanks to this, we can study in more detail the processes occurring during the integration of implants with biological tissues, and develop more effective methods of treatment and rehabilitation.

Method

The aim of the study is to improve the results of prosthetics with fixed structures based on dental implants in patients with postmenopausal osteoporosis.

The object of the study, in order to solve the tasks, set and achieve the purpose of the study, was the results of examination and treatment of 90 patients of menopausal women aged 45 to 65 years (± 51.6 years) who sought orthopedic dental care. This contingent of patients with partial secondary adentia in need of orthopedic treatment based on dental implants were divided into the following groups.

The main (I) group consisted of 30 menopausal women suffering from postmenopausal osteoporosis who received ALPHA DENT Superior Active dental implants (Germany) in a buffer solution with a hydrophilic SLA-Active surface.

The comparison group (II) consisted of 30 menopausal women suffering from postmenopausal osteoporosis who had ALPHA DENT Active dental implants with a hydrophilic 3D-Active surface.

Both groups were divided into subgroups depending on the treatment method:

- A is a subgroup of patients receiving traditional prosthetics treatment based on dental implants;
- B is a subgroup of patients receiving special treatment for prosthetics based on dental implants, taking a vitamin and mineral complex consisting of three drugs that are administered at three main stages of implantation: bone preparation for implantation - Pre-Implantation Complex Alpha (powder for oral solution), healing - Fast integration Complex Alpha. (capsules), and, osseointegration - Post integration Complex Alpha (capsules).

Results

The control group consisted of 30 patients with intact dentitions or dentitions restored by a non-removable structure, with no history of mineral metabolism disorders, cardiovascular and endocrine diseases.

In order to characterize the state of metabolism of skeletal bone tissue and the intensity of remodeling, we studied the levels of total calcium and phosphorus in blood plasma.

Table 1. The values of the studied indicators of mineral metabolism and markers of bone remodeling in the blood obtained before taking the complex of drugs and before dental implantation

Patient groups	I	II	Control
Alkaline phosphatase	24,1	25,7	22,0

One of the equally important indicators that allow us to determine the activity of bone metabolism is the bone isoenzyme of alkaline phosphatase, which is produced by osteoclasts and participates in the maturation and mineralization of the intercellular substance of bone tissue. According to the data obtained, the average blood content of this marker was 21.1 u/l in patients of group I and 20.7 u/L in patients of group I, which is higher than the average value in the control group (22.0 u/l). The percentage differences also indicate some variability between the groups and a deviation from the data obtained in the control group – in group I by 9.55% and in group II by 16.8% higher. An increase in alkaline phosphatase with concomitant violation of calcium phosphorus metabolism and increased secretion of PTH indicates pathological changes in bone metabolism, since the bone isoenzyme alkaline phosphotase is produced by osteoclasts – the main participants in bone resorption.

In order to compare the effectiveness of the proposed treatment, groups I and II of patients with postmenopausal osteoporosis were divided into subgroups with an equal number of subjects, depending on the treatment method (randomized controlled method):

A is a subgroup of patients receiving traditional prosthetics treatment based on dental implants. Patients received dietary supplements of calcium at a dosage of 1000 mg / day and vitamin D 1000 units for a course of 3 weeks, starting 3 days before dental implantation surgery.

B is a subgroup of patients receiving special treatment for prosthetics based on dental implants, taking a vitamin and mineral complex consisting of three drugs that are administered at three main stages of implantation: bone preparation for implantation - Pre Implantation Complex Alpha (powder for oral solution, No. 3), healing period - Fast integration Complex Alpha (capsules, No. 10), and, the period of osseointegration - Post integration Complex Alpha (capsules, No. 10)

A month after the start of taking the drugs, the results of the study of patients, depending on the method of treatment, were as follows.

Table 1. The values of the studied indicators of mineral metabolism and markers of bone remodeling in the blood, obtained one month after the start of taking the complex of drugs and dental implantation

Patient groups	I		II		Control
	А	Б	А	Б	
Alkaline phosphatase	22,1	19,9	25,7	22,1	22,0

Thus, in patients of group I with A and B bone category, the average value of the alkaline phosphatase level decreased by 10% in subgroup B, in patients of subgroup A, no significant deviations were observed compared with the baseline data. With regard to this indicator, in patients of group II with bone category C, as well as in patients of group I, significant changes were noted in the subgroup with the traditional method of treatment, however, it is worth noting that, in addition, the average value of alkaline phosphotase in the blood in patients of the subgroup receiving the proposed complex The level of drugs increased by 12% compared with the initial data obtained in the baseline study of group II patients, and after treatment, the values of the indicator were close to those of patients in the control group.

When studying the indicators of alkaline phosphatase in the blood, the following principle of changes was observed. Thus, in patients of both groups, subgroups with traditional treatment with an initially reduced index, no significant changes were found after treatment: in subgroup A (I), the level of phosphatase in the blood decreased by 2.2%, and in subgroup A (II) – remained unchanged. Thus, the "one two three" complex can affect the balance of calcium and phosphorus in the body, affecting the level of calcium and, in turn, the level of parathyroid hormone. This represents some form of physiological regulation, where the balance of calcium in the body is maintained, and, if necessary, normal calcium levels are restored, taking into account the regulation of PTH. So, thanks to a comparative assessment of treatment methods, it can be distinguished that the "one two three" complex has a greater efficiency in restoring the components of mineral metabolism in the blood, helps to maintain the necessary level of calcium in the blood, reducing the production of thyroid PTH and thereby inhibits the processes of bone resorption.

Conclusion

The "one two three" complex can affect the balance of calcium and phosphorus in the body, affecting the level of calcium and, in turn, the level of parathyroid hormone. This represents some form of physiological regulation, where the balance of calcium in the body is maintained, and, if necessary,

normal calcium levels are restored, taking into account the regulation of PTH. Thus, thanks to a comparative assessment of treatment methods, it can be distinguished that the "one two three" complex has a greater efficiency in restoring the components of mineral metabolism in the blood, helps maintain the necessary level of calcium in the blood, reducing the production of alkaline phosphatase and thereby inhibits the processes of bone resorption.

Reference

1. Cohen-Solal, M. Marqueurs biochimiques du remodelage osseux / M. Cohen-Solal, M. C. de Vernejoul // Revue du rhumatisme. - 2006. - Vol. 73, iss. 8. - P. 804-806.
2. Early changes in biochemical markers of bone formation correlate with improvements in bone structure during teriparatide therapy / H. Dobnig [et al.] // J. Clin. Endocrinol. Metab. - 2005. - Vol. 90, iss 7. - P. 39703977.
3. Harade, S. Control of osteoblast function and regulation of bone mass / S. Harade, G. A. Rodan // Nature. - 2003. -Vol. 423, № 6937. - P. 349-355.
4. Phosphate and mineral homeostasis / ed.: S. G. Massry, M. Olmer, E. Ritz. - New York: Springer Science & Business Media, 2013. - 553 p.
5. Raggat, L. J. Cellular and molecular mechanisms of bone remodeling / L. J. Raggat, N. C. Partridge // J. Biol. Chem. 2010. - Vol. 285, № 33. - P. 25103-25108.
6. Romero Barco, C. M. Biochemical Markers in Osteoporosis: usefulness in Clinical Practice / C. M. Romero Barco, S. Manrique Arija, M. Rodríguez Pm-ez // Reumatol. Clin. - 2012. - Vol. S, № 3. - P. 149-152.
7. Evaluation of the effectiveness of orthopedic treatment using dental implants in patients with systemic osteoporosis. Akbarov A.N., Tillakhodzhaeva M.M. // Stomatologiya No. 1 2023 (90) pp. 66-69
8. Evaluation of the effectiveness of orthopedic treatment using dental implants in patients with systemic osteoporosis /Akbarov A.N., Tillakhodzhaeva M.M. // Integrative dentistry and maxillofacial surgery volume 2, issue 2, 2023. pp. 201-204