

EVALUATION OF THE EFFECTIVENESS OF ORTHOPEDIC TREATMENT USING DENTAL IMPLANTS IN PATIENTS WITH SYSTEMIC OSTEOPOROSIS

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ANNOTATION

Currently, one of the effective and promising areas in dentistry for restoring the integrity of the dentoalveolar system with partial or complete absence of teeth is dental implantation. However, despite its advantages, there are some difficulties and even contraindications to the use of this method in patients with jaw bone loss. In addition, the quality of bone tissue is an important factor that may affect the outcome of the treatment of dentition defects by dental implantation. Ideas about the pathogenesis of osteoporosis and its effect on the dentoalveolar system will prevent and significantly reduce the number of complications arising from dental implantation and subsequent orthopedic rehabilitation of such a contingent of patients.

Key words: assessment of the degree of osteoporosis, remodeling, osseointegration.

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ОЦЕНКА ЭФФЕКТИВНОСТИ ОРТОПЕДИЧЕСКОГО ЛЕЧЕНИЯ С ИСПОЛЬЗОВАНИЕМ ДЕНТАЛЬНЫХ ИМПЛАНТАТОВ У БОЛЬНЫХ СИСТЕМНЫМ ОСТЕОПОРОЗОМ

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АННОТАЦИЯ

В настоящее время одним из эффективных и перспективных направлений в стоматологии для восстановления целостности зубочелюстной системы при частичном или полном отсутствии зубов является дентальная имплантация. Однако, несмотря на ее преимущества, имеются некоторые сложности и даже противопоказания к использованию этого метода у пациентов с потерей костной массы челюстей. Кроме того, качество костной ткани является важным фактором, который может отразиться на исходе лечения дефектов зубных рядов методом дентальной имплантации. Представления о патогенезе остеопороза и его влияния на зубочелюстную систему позволят предупредить и значительно снизить количество осложнений, возникающих при дентальной имплантации и последующей ортопедической реабилитации подобного контингента больных.

Ключевые слова: оценка степени остеопороза, ремоделирование, остеоинтеграция.

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Osteoporosis (OP) is a systemic disease of the skeleton, which reduces the thickness of the bones, leading to increased risk of fractures. The disease develops gradually and is often clinically diagnosed after a fracture, which allows it to be characterized as a "hidden epidemic". Population aging is leading to a significant increase in the number of osteoporotic fractures, especially in postmenopausal women. If the rates of increase in life expectancy of the population and the number of elderly people observed in the last decade continue, it is expected that by 2050 the incidence of osteoporotic fractures will increase by 2.4 times [1]. According to WHO experts, OP is one of the most common diseases, which, along with myocardial infarction, oncological pathology and sudden death, occupies a leading place in the structure of morbidity and mortality.

According to the recommendations of the WHO Working Group, BP is considered to be a decrease in bone density of 2.5 standard deviations (SD) or more below the peak bone mass in young people of a healthy population (criterion T) when performing x-ray absorptiometry. The range of ± 1.0 SD is defined as normal bone mass, and from -1.0 to -2.5 SD is defined as low bone mass, or osteopenia [14].

In the presence of a "low-energy" (pathological) fracture and a decrease in BMD to the level of osteopenia, the diagnosis of OP is considered established, since the fracture itself is a direct confirmation of bone fragility. Computed tomography (CT) can be used to determine BMD, which is the only method that allows you to obtain three-dimensional images of the bone structure and determine the boundaries of bone layers. Unlike DXA, there are no BMD distortions associated with the patient's obesity, as well as those caused by comorbidities, in CT. However, high doses of radiation during CT, as well as the high cost of the examination, limit the widespread use of this technology in the diagnosis of OP, its use is justified only in situations requiring differential diagnosis [15].

Assessment of the degree of OP and jaw atrophy is very important from a prognostic point of view when planning prosthetics. Accounting for all associated conditions will allow for the most effective prosthetics, taking into account the formation of preoperative indications for dental implantation.

The bone tissue of the jaws differs little in structure and chemical composition from other bones of the skeleton. However, in the alveolar bone, the processes of internal restructuring proceed more actively than in other bones of the skeleton. Normally, the height of the alveolar ridge is maintained by a physiological balance between bone formation and bone resorption, which are regulated not only by systemic, but also by local factors [9].

Until now, the role of osteoporosis in the reduction of bone mass, jaws, pathogenesis of periodontal disease, loss of teeth is unclear; and other changes. According to Chesnut S.N. (2001), there may be three types of relationships: 1) systemic osteoporosis as a risk factor for the development of periodontitis; 2) systemic osteoporosis as a risk factor for the occurrence of osteopenia of the jaws, regardless of the presence of periodontitis; 3) periodontitis is the primary (exclusive) risk factor for osteopenia of the jaws. Despite many scientific studies over two decades, some issues remain controversial and insufficiently studied. So, M.K. Jeffcoat (1998) found an association between systemic osteoporosis, decreased jaw bone mass, and tooth loss: There is also evidence; that treatments to increase bone mineral density, such as hormone replacement therapy or bisphosphonates, help preserve teeth; and slows the loss of alveolar bone. [3,6]

Given the wide prevalence of OP in patients of various profiles, the role of a dentist in the diagnosis and correction of this pathology is becoming increasingly important. Particular attention should be paid to patients of the older age group due to the increased risk of developing postmenopausal and senile OP [6]. Moreover, in men with androgen deficiency, the loss of bone mineral density is more pronounced than in women with hypogonadism [7,8]. Several studies have already shown that estrogen deficiency is closely associated with the development of periodontitis and OP [6, 7, 9]. Recently, an increasing number of researchers suggest that postmenopausal OP contributes to the development and progression of periodontitis [6,9]. It has been shown that periodontal bacteria contribute to alveolar bone loss in periodontitis by increasing osteoclast activity and/or by releasing toxins and pro-inflammatory cytokines

[9]. However, the underlying mechanisms are still not clear.

In the alveolar bone, the processes of internal restructuring proceed more actively than in other bones of the skeleton. Corresponding to the change in the functional load on the dentoalveolar apparatus, remodeling performs two functions: 1) modifies the structural anatomy of the tissue in such a way that the loaded trabeculae and structures are maximized, in less loaded areas, the bone bars become thinner, and the bone resolves; 2) controls the homeostasis of calcium and minerals. [27]

Remodeling includes two closely related processes - the destruction and synthesis of bone. In young people, bone formation processes predominate, due to which the alveolar bone is formed and grows. In middle-aged people, these processes are normally balanced. With age, the height of the alveolar ridge decreases, which is associated with physiological or senile atrophy [10-12].

Bone tissue, like all other tissues, reacts to a general or local pathological process and has a large adaptive response to variations in functional load [7]. By changing the direction and thickness of the bone plates, the structure of the bone tissue in general and in the jaw system in particular is restructured [10]. Eruption of milk and permanent teeth, loss of teeth, prosthetics change the load on certain sections of the alveolar processes, causing restructuring (remodeling) of the bone structure of the jaws [11].

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ridge decreases, which is associated with physiological or senile atrophy [10-12].

The involutive decrease in the height of the alveolar ridge is associated with a decrease in the functional load on the dentition. On the one hand, the need for nutrients becomes less with age, since an elderly person consumes much less food than a young one. On the other hand, the chewing force of the muscles weakens, therefore, the chewing load on the periodontium decreases. The processes of remodeling rebuild the bone tissue in accordance with the changing load. [26]. The second important factor influencing the involutive processes in the alveolar bone is age-dependent loss of bone mass [13]. Bone tissue mineralization reaches its maximum value by the age of 25-35, after 40 years it decreases by about 1% per year in women and by 0.5% in men.

L.Minsk, A.M. Poison supports the notion that the presence of osteoporosis is not a contraindication for the use of endosseous implants, as in their study, all women, regardless of osteoporosis and hormonal status, experienced almost the same results after dental implantation. The results of the study B. Friberg et al. (2001) showed that in patients with signs of systemic osteoporosis (reduced bone mineral density of the lumbar spine and femur), and osteoporotic manifestations in the structure of the alveolar bone, the implants functioned successfully for many years.

M.A. Amorim et al. (2006) observed rejection of only one implant (1.2%), which, according to the authors, corresponds to the literature data and cannot be attributed to systemic osteoporosis. [10,1,8]

However, M. Augut et al. (2001) note that in women with postmenopausal osteoporosis who do not receive hormone replacement therapy, the percentage of rejection of implants in the upper jaw increases. Research I.E. Naert (1997), P. Farzad et al. (2004) showed that the osseointegration of implants in the maxilla is generally worse than in the mandible. The main reason is the condition of the bone tissue - a reduced amount of bone combined with a thin one. cortical layer and low bone density [2,11]

M. Chanavaz (1999), E.S. Elsubeihi, G.A. Zarb (2002) believe that the current standards of implant-supported orthopedic treatment

should not exclude patients with relative or absolute contraindications without exploring the possibility of improving and stabilizing their general condition. [4,7]

According to M.A. Amorim et al. (2006), there is no correlation between systemic osteoporosis and densitometric parameters of mandibular bone quality. A study by W. Becker et al. (2000) showed that a simple visual assessment of bone quality at the implant site may be more informative for the prediction of implant osseointegration than bone mineral density obtained from the study of the bones of the peripheral skeleton. [1, 18]. E.K. Kaue (2007) believes that osteoporosis and periodontal disease share several common risk factors: older age, heavy smoking, calcium and vitamin D deficiency in body tissues. The author supports the view that osteoporosis, regardless of periodontitis, causes a decrease in the height of the alveolar bone, and drug therapy of osteoporosis contributes to the preservation of the volume of the alveolar bone. [21]

S. Sidiropoulou-Chatzigiannis et al. (2007) indicate that in osteoporosis there is a decrease in the density of the alveolar bone and there is a loss of bone mass of the jaws due to a violation of the coordination of the processes of resorption and bone formation. Both bone resorption and bone formation are accelerated, and excessive bone resorption usually results in bone loss. [23]

Jaw bone tissue as an integral part of the skeletal system responds to exogenous and endogenous factors affecting the human body. D. Knezovic Zlataric et al. (2007) analyzed systemic and local factors associated with alveolar bone mass loss. The study showed that osteoporosis, kidney disease and hormonal disorders were closely correlated with bone loss among systemic factors, chronic periodontitis, early loss of teeth and inadequate prosthetics were among local factors. [22,25].

Choel L. et al. (2003) assessed bone mineral density prior to implant placement. According to the authors, the cortical and trabecular bone of the lower jaws in women is more sensitive to systemic influences, while in men it is more sensitive to local influences. This is consistent with those studies that have found a correlation between osteoporosis and bone loss in the jaws. [20,24]

L.F. Cooper et al. (2000) believe that dental

implants can be successfully used in patients with osteoporosis if the following principles are followed. Before placing implants, a comprehensive examination of patients is recommended to assess the state of bone tissue and metabolic disorders. Patients should be examined by an orthopedist, endocrinologist or gynecologist and, if necessary, receive a course of treatment. Physiological doses of vitamin D and calcium are recommended during the postoperative period. Patients should follow a balanced diet and try to quit smoking, as smoking is a risk factor for the development of osteoporosis (Melton L.J., 1997) and implant rejection [5,9].

Thus, literature data indicate that the initial state of bone density is important not only during the period of dental implantation, but also in the long term, during the rehabilitation period after orthopedic treatment.

CONFLICT OF INTERESTS

The authors declare the absence of obvious and potential conflicts of interest related to the publication of this article.

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AVAILABILITY OF DATA AND MATERIALS

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All authors contributed to the design and interpretation of the study and to further drafts. All authors read and approved the final manuscript.

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All applicable international, national and/or institutional ethical guidelines have been followed.

CONSENT FOR PUBLICATION

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КОНФЛИКТ ИНТЕРЕСОВ

Авторы заявляют, что данная работа, её тема, предмет и содержание не затрагивают конкурирующих интересов.

ИСТОЧНИКИ ФИНАНСИРОВАНИЯ

Авторы заявляют об отсутствии финансирования при проведении исследования.

ДОСТУПНОСТЬ ДАННЫХ И МАТЕРИАЛОВ

Все данные, полученные или проанализированные в ходе этого исследования, включены в настоящую опубликованную статью.

ВКЛАД ОТДЕЛЬНЫХ АВТОРОВ

Все авторы внесли свой вклад в подготовку исследования и толкование его результатов, а также в подготовку последующих редакций. Все авторы прочитали и одобрили итоговый вариант рукописи.

ЭТИЧЕСКОЕ ОДОБРЕНИЕ И СОГЛАСИЕ НА УЧАСТИЕ

Были соблюдены все применимые международные, национальные и/или институциональные руководящие этические принципы.

СОГЛАСИЕ НА ПУБЛИКАЦИЮ

Не применимо.

ПРИМЕЧАНИЕ ИЗДАТЕЛЯ

Журнал "Интегративная стоматология и челюстно-лицевая хирургия" сохраняет нейтралитет в отношении юрисдикционных претензий по опубликованным картам и указаниям институциональной принадлежности.

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