IDENTIFICATION OF OSTEOPOROSIS IN DAILY DENTAL PRACTICE AND ITS IMPORTANCE

ИДЕНТИФИКАЦИЈА НА ОСТЕОПОРОЗАТА ВО СЕКОЈДНЕВНАТА ПРАКСА НА СТОМАТОЛОГИЈАТА И НЕЈЗИНАТА ВАЖНОСТ

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Abstract

Osteoporosis is progressive metabolic bone disease, which is characterized with decreased bone mass, microarchitecture weakness which further is accompanied with increased bone fragility and increase of risk of bone fracture. Osteoporosis is a health condition which is furtively developed in asymptomatic forms. Since most of the cases are diagnosed only when a bone breaks, the disease is a high risk for population's health, followed with high cost of healing and rehabilitation. In this context, science broadens its research dimensions, including other diagnostic methods, except the standard one, such as the DXA test which is more affordable and accessible for the population. In this manner, the disease can be diagnosed on time and patients can start their treatment in appropriate time before the fracture happens, which, in most of the cases, is life endangering. Panoramic radiography is a diagnostic method, which is routinely used in the dental practice. Since it is cost-effective and taking into consideration the frequency of its application, there is a necessity for research and defining the radio morphometric parameters which identify bone quality. Scientists used some of the radio morphometric parameters for this purpose, but most of the studies showed the great importance of defining some of them: MCI-Mandibular Cortical Index, PMI-Panoramic Mandibular Index, MI-Mental Index and M/M report of Panoramic Radiography by documenting their connectivity and early defining of bone quality and connectivity with body BMD (Bone mineral Density). **Key words:** osteoporosis, panoramic radiography, mandibular cortical index, panoramic mandibular index, mental index.

Апстракт

Остеопорозата е прогресивна метаболна болест на коските, која се карактеризира со намалена коскена маса, слабеење на коските кое дополнително е придружено со зголемена кршливост на истите и зголемен ризик од фрактура. Остеопорозата е здравствена состојба која се развива тајно во асимптоматска форма. Бидејќи во повеќето случаи се дијагностицира само кога доаѓа до фрактури на коските, болеста претставува голем ризик за населението, каде спаѓаат и високите трошоци за заздравување и рехабилитација. Во овој контекст, науката ги проширува своите истражувачки димензии, вклучително и други дијагностички методи, покрај стандардните, како што се DXA тестовите кои се подостапни за населението, за да може болеста навремено да се дијагностицира и пациентите да започнат со лекување пред да настанат скршеници кои во многу случаи го загрозуваат животот. Панорамска радиографија е дијагностичка метода која рутински се користи во стоматолошката пракса. Поради исплатливоста и зачестеноста на нејзината примена, воочена е потребата од истражување и дефинирање на идентификационите параметри со кои се идентификува квалитетот на коските. Научниците користат некои од радиоморфометриските параметри за оваа цел, но бројни студии ја истакнуваат големата важност за дефинирање на три од нив: MCI - кортикален мандибуларен индекс, PMI - панорамски мандибуларен индекс, МИ - ментален индекс, како најсигурни показатели за евалуација на квалитетот на коските во панорамската радиографија што ја документира нивната поврзаност и рано одредување на квалитетот на коските со телесна BMD. Потребни се дополнителни научни истражувања за да се стандардизираат податоците и индикаторите со висока чувствителност и специфичност за идентификација на знаците на остеопороза во стоматолошката пракса. **Клучни зборови:** остеопороза, панорамска радиографија, мандибуларен кортикален индекс, ментален индекс.

Introduction

Osteoporosis is progressive metabolic bone disease, which is characterized with decreased bone mass, microarchitecture weakness which further is accompanied with increased bone fragility and increase of risk of bone fracture[1, 2, 3].

This disease develops in silent progressive forms and quite often is not detected until the bones are broken spontaneously without immense trauma. So, rightfully the disease is called silent epidemic. Women over 50 (fifties) develop osteoporosis 50 (fifty) times more than men[1,4,6].

Since most of the cases are diagnosed only when a bone is broken, the disease shows a high risk for popula-

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tion's health, followed with high cost of healing and rehabilitation[1, 2].

Based on WHO, the criteria for defining osteoporosis is when BMD (Bone Mineral Density) shows T-score under -2.5 and shows diagnostics and intervention threshold.

One of the most valid techniques for BMD (Bone Mineral Density) measurement is DXA-test, (Dual-energy x-ray absorptiometry).

In most of the countries, including USA, DXA-test is not easily applicable for mass population because of the high cost. Therefore, the scientists are seeking other accessible and effective diagnostics methods for the population, whose purpose is detection of early osteoporosis indication[4, 5, 6].

Morphological jaws changes in patients with osteoporosis

Morphological changes can be seen in both jaws, but especially in the mandibula and this is not a coincidence because the mandibula consists of cortical bone which surrounds the trabecular part of the lower jaw.

The cortical part of the mandibula is more conditioned from general conditions of the bones in the body than the trabecular part or elevation of the alveolar ridge, which in continuity is submitted to absorptive processes of multifunctional nature. Consequently, the cortical bone of the mandibular is submitted to absorptive processes in patients with osteoporosis. So, there is a significant relation between the mandibular cortical bone, quality, quantity and body BMD[6, 7, 25].

Researchers report that the mandibular cortex of buccal in the region distally from mental foramen has a closer correlation with the density of the body bones than the lingual part[8].

Patients in dental practice are subjected to panoramic radiography on routine basis. This routine examination, which is cheaper also, serves for identifying patients with osteoporosis by using the definite radio morphometric parameters[11, 27].

Radio morphometric indicators - their value in osteoporosis detection

A research found that the correlation between osteoporosis and oral health started in 1960. Kribbs et al concluded that women suffering from osteoporosis have three times higher chance for toothlessness. Tauchi et al, in 2005 concluded that Japanese women, who were identified by the dentists by using the data from the cortical part of the mandibular, were diagnosed with osteoporosis or osteopenia. Clementi in 1994 presented MCI index as measurement index of mandibular cortex density[9, 10, 27].

Scientists used some of the radio morphometric parameters for this purpose. In many studies they have highlighted the great importance of identifying some of them for which the studies are supplementary and more detailed: MCI - Mandibular Cortical Index, PMI-Panoramic Mandibular Index, MI - Mental Index, which serves for surveying signs of osteoporosis and bone quality in Panoramic Radiography and enables the identification of patients with osteoporosis and referring them further to start the treatment, and preventing the sore consequences which the disease carries.

MCI - Mandibular Cortical Index (MCI) or the Clement index refers to the appearance of the inferior cortex of the mandibula, distally from the mental foramen on both sides of the mandibular and, according to Clementi and the associates, was divided in three subgroups (C1-C3) based on the findings of the appearance in the lower boundary of the mandibular cortex.

C1 - Endosteum margins of the cortex is clearly uniform on both sides of the jaw.

C2 - Endosteum margins show semilunar defects (lacunar resorption or visual, it looks like they create endosteum cortical residue in one or both sides of the lower jaw).

C3 - Cortical layer of the lower jaw forms sore endosteum layers and is clearly very porous.

Many studies reported that women with medium erode cortex and those with emphasized erode of the cortex have higher possibilities to develop osteoporosis. Clement et al found the changes in mandibular cortex, observed in Panoramic Radiography, and have significant relation with BMD of the lower jaw. Researches made by Cakur and associates gave similar data. MCI Index validity is limited and liaisons a lot also with ability of the examiner [18, 31, 32, 33].

Horner and Dalvin in their long researches found a significant correlation between MCI and BMD of mandibular[25, 26, 27, 28].

High value index and researched in details is MI (Mental Index) or MCW (Mandibular Cortical Width) to which is referred the width of lower boundary of mandibular under two mental foramen according to the Lagerton methods[25].

Important study in this direction is a three year study called Osteodent, in this project are involved five European countries, their objective was to find trustful radiologic indicator which will serve to identify osteoporosis.

The study offered many detailed data by putting MCI index in an inferior position in report with MI index. In this case the researchers suggested that only the patients

with rate of MI < 3mm must be referred for DXA test and additional examination

These results were in the same line with the founding of Dalvin and Honer.

MI - MENTAL INDEX, is the average of width of boundary of lower mandibular under the mental foramen, in both sides of the lower jaw, according to Langerton method.

Boundary of MI index is MI < 3 mm.

PMI - PANORAMIC MANDIBULAR INDEX, presented by Benson was developed based on the work by Wical and Swoope, which after the long research came to the conclusion that no matter the constant absorptive multifactorial processes regarding the mental foramen, the part under foramen remains relatively constant. PMI, describes the proportion of the width of the cortex from the distance of mental foramen until the edge of lower mandibular cortex-MI/h, a technique prescribed by Benson.

Boundary of PMI index is PMI < 0.3mm.

M/M report, which is counted by separating total length of height of mandibular from the distance from the center of mental foramen until the edge of lower mandibular.

MI, PMI, M/M indicators are measured on both sides of the lower jaw by calculating the average[25, 26, 27, 28].

Highlights of Conclusions

The use of Panoramic Radiogrpahy in purpose to detect earlier the osteoporosis would bring great benefits in diagnostics economic costs, prevention and treatment of osteoporosis as a disease with immense consequences in human health.

Since Panoramic Radiography quite often is used in dental practice and is repetitive diagnostics method, with screening and same exposing parameters it makes it very suitable and for matching purposes.

Many researches founded a very valuable connectivity between the eroded cortex MCI C-2 and C-3 and dilution cortex of mandibula, MI<3mm and PMI<0.3 mm detected in Panoramic Radiography and suggested these indicators as very valuable for identification of low BMD of the body, especially in the women after the menopause.

Furthermore many challenging researches should be needed so we could have clear recommendation that if the dentist in primary care could use these data for referral of patients for additional examination in regards to osteoporosis and could we arrive to prevent the fractures of the bones to this disease with immense impact on the population health.

The use of radiological automatic digital software program is an imperative of time which mitigate a lot the precision of measurement by reducing in maximum the possible mistake of made measurement with other manual methods.

At the same time, before the prosthetics rehabilitation it is very important to evaluate the density of jaw bones, to define the referral point and radio morphometric measurements.

We clearly need to take into consideration the final diagnosis for osteoporosis and in the safe way to be done through the safe diagnostics methods DEXA - examination and signs in oral radiography can be used only as primary screening.

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