

The Method of Innovative Diagnosis of Osteoarthritis

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Abstract: To optimize the diagnosis of osteopenia using digital reference osteodensitometry for an objective assessment of the severity of osteoarthritis of the knee joint before and after treatment with chondroprotectors. A comprehensive clinical examination was performed in 90 patients with a clinical picture of subacute phase of periarthrosis (42) and osteoarthritis of the knee joint (48) of working age from 30 to 50 years. The control group consisted of 40 persons. The use of reference digital osteodensitometry made it possible to objectively assess the levels and topography of the distribution of minerals in the control group and in patients with osteopathy at various stages of clinical observation. The mineral density of bones depends on the sector and area of study, which allows us to consider it an objective criterion for the direction of the restructuring of their structure.

Keywords: periarthrosis, osteoarthritis, bone mineral density, digital reference osteodensitometry, innovative diagnostics.

Osteoarthritis (OA) is a chronic progressive disease, a characteristic feature of which is the presence of destructive changes in articular cartilage and subchondral bone with the development of marginal osteophytes. However, with OA, the entire joint is involved in the pathological process – the capsule, ligaments, synovial membrane, periarticular muscles. The disease is an important socio-economic problem due to the widespread (OA ranks 1st among other rheumatic diseases), a significant deterioration in the quality of life of the patient due to constant pain syndrome, as well as high disability [4]. Most researchers consider deforming OA to be a multi-causal disease, and regardless of the known external causes, the influence of genetic factors reaches 39-65%.

The knee joint in everyday life experiences enormous loads, sometimes reaching 300% of body weight. The main reason for the development of OA is the imbalance of the processes of cartilage destruction and its renewal under the influence of various endogenous and exogenous factors. As a result, the usual load becomes excessive and, causing degeneration of articular cartilage, leads to deforming arthrosis and varying degrees of aseptic inflammation of the joint [2].

The disease is based on a violation of the adaptation of articular cartilage to mechanical stress, first of all, a shift in the balance of cartilage tissue metabolism towards catabolic processes. Normally, the synthesis and degradation of cartilage elements are in a balanced state. Changes in articular cartilage in OA can be caused by both genetic and various environmental factors, i.e. they are characterized by multifactoriality [1,3].

The purpose of the study: Optimization of the diagnosis of osteopenia using digital reference osteodensitometry for an objective assessment of the severity of osteoarthritis of the knee joint before and after treatment with chondroprotectors.

Material and methods: A comprehensive clinical examination was conducted in 90 patients with a clinical picture of the subacute phase of periarthrosis (42) and osteoarthritis of the knee joint (48) of working age from 30 to 50 years. The control group consisted of 40 individuals at the time of examination and in anamnesis without periarticular and osteoarticular pathology of comparable age and premorbid background.

X-ray examination was performed using digital low-dose X-ray diagnostic devices. To measure bone mineral density (BMD), the method of reference osteodensitometry was used, which allows

determining the desired value on areas of different dimensions. Measurements were performed on digital radiographs (computer monitor screens) of the upper (1), middle (2) and lower (3) sectors in the medial (A), median (B) and lateral (C) zones of the knee joint with a posteriori calculation of the average values of the BMD index.

Results and discussion: To assess the effect of therapy on X-ray parameters (the degree of narrowing of the X-ray articular gap - RSCH - and osteophytosis), all patients at the time of inclusion in the study and in the control periods of observation were X-rayed knee joints in straight, lateral and axial projections in the position of maximum knee extension in order to best visualize the anterior parts of the RSCH, study the lateral and medial sections tibiofemoral area (TFA).

RSCH was measured on the most narrowed section of the medial TFA using a magnifying glass with a division price of 0.1 mm. The degree of narrowing of the RSCH was determined by a semi-quantitative method in points: 0 points – no narrowing; 1 point - 4.5–5 mm; 2 points - 4-4.5 mm; 3 points - less than 4 mm.

The severity of osteophytosis was assessed by a semi-quantitative method in points: 0 points – osteophytes (OF) are absent; 1 point – sharpening of articular surfaces; 2 points - no more than 2 small OF; 3 points – 3 small OF or more. The radiographs were evaluated by the same radiologist.

All the listed clinical and radiological indicators were determined at the time of inclusion in the study and at the control follow-up periods: after 6 months, 1, 2 and 3 years.

After 6 months of continuous use of teraflex, patients registered positive dynamics of all clinical indicators, which in patients of the main group persisted throughout the entire follow-up period.

BMD in various sectors and zones of the knee joint in the control group varied (Table) from 0.93 ± 0.10 (sector 3, zone C) to 1.40 ± 0.13 mg/mm² (sector 1, zone A). BMD in patients with clinical signs of periarthritis before treatment also varied by sectors and scanning zones and was generally lower than in the control group with a statistically significant difference in sectors: 1 (zones: A, B, C), 2 (zones: A,B), 3 (zone A).

BMD in patients with osteoarthritis clinic before treatment was lower not only in comparison with that in the control group, but also in comparison with patients with periarthritis, varying from 0.62 ± 0.14 in sector 3 (zone C) to 0.73 ± 0.11 mg/mm² in sector 1 (zone A).

At the final stage of the study, after performing therapeutic measures (medication and physiotherapy), the BMD of the knee joint changed towards an increase in patients of both groups with positive dynamics in patients with periarthritis, while maintaining the regularity of the maximum osteoarthritis index in sectors 1 and 2 (zones: A, B, C). The process of restoring BMD in the final phase of treatment in patients osteoarthritis was also favorable, but more torpid than in individuals with only periarthritis clinic.

Conclusion: The change in the BMD of the knee joint is an objective criterion for assessing the severity of arthrosis in various phases of the pathology of the knee joint, including professionally conditioned. The developed methodological approach to obtaining a detailed characteristic of the state of bone structure density in the dynamics of patient observation makes it possible to predict the course of these diseases and monitor the effectiveness of their treatment. It has been established that this indicator can be a criterion for the severity and direction of bone structure restructuring both at the stage of primary diagnosis and in the dynamics of observations and allows objectively monitoring the effectiveness of treatment.

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