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ULTRASOUND EXAMINATION IN THE DIAGNOSIS OF OSTEOARTHRITIS

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УЛЬТРАЗВУКОВОЕ ИССЛЕДОВАНИЕ В ДИАГНОСТИКЕ ОСТЕОАРТРИТА

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OSTEOARTRIT TASHXISIDA ULTRATOVUSH TEKSHIRUVI

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Цель: оценка информативности УЗИ в диагностике гонартрита. **Материал и методы:** для определения нормального соотношения анатомических структур коленного сустава обследованы 30 здоровых лиц в возрасте от 30 до 55 лет. Исследования проводились по общепринятой чрескожной методике мультипозиционным сканированием выше и ниже надколенной кости по боковым поверхностям коленного сустава. **Результаты:** у лиц контрольной группы суставной хрящ имел вид гипоехогенной полоски с четкими средневолнистыми контурами на сочленяющихся поверхностях костей диаметром от $4,0 \pm 0,6$ до $6,0 \pm 0,1$ мм. **Выводы:** одним из достоинств УЗИ коленного сустава является возможность, с одной стороны, проводить диагностику остеоартрита в дебюте заболевания и определять стадию процесса, с другой, – осуществлять дифференциальную диагностику с другими заболеваниями.

Ключевые слова: ультразвуковое исследование, коленный сустав, остеоартрит.

Maqsad: gonartrit tashxisida ultratovushning informativligini baholash. **Material va usullar:** tizza bo'g'imining anatomik tuzilmalarining normal munosabatini aniqlash uchun 30 yoshdan 55 yoshgacha bo'lgan 30 nafar sog'lom odam tekshirildi. Tadqiqotlar umumiy qabul qilingan teri osti texnikasidan foydalangan holda, tizza bo'g'imining tepasida va ostidan ko'p pozitsiyali skanerlash yordamida amalga oshirildi. **Natijalar:** nazorat guruhida artikulyar tog'ayga diametri $4,0 \pm 0,6$ dan $6,0 \pm 0,1$ mm gacha bo'lgan suyaklarning artikulyar yuzalarida aniq, o'rta to'liqlik konturli gipoechoik chiziq ko'rinishi bor edi. **Xulosa:** tizza bo'g'imlarining ultratovush tekshiruvining afzalliklaridan biri bu, bir tomondan, kasallikning boshlanishida osteoartritni tashxislash va jarayonning bosqichini aniqlash, boshqa tomondan, boshqa kasalliklar bilan differentsial tashxis qo'yish.

Kalit so'zlar: ultratovush tekshiruv, tizza bo'g'imi, osteoartrit.

The problem of osteoarthritis (OA) in the last quarter of a century has acquired enormous general medical and social significance, determined by the widespread prevalence of the disease, the rapid development of functional disorders in the defeat of the "bearing" joints of the lower extremities - knee and hip. OA is the most common joint disease, which affects at least 20% of the world's population. The disease usually begins at the age of over 40 years. X-ray signs of osteoarthritis are found in 50% of people aged 55 years and in 80% over 75 years. OA of the knee joint (gonarthrosis) develops more often in women, and hip joint (coxarthrosis) – in men. 81 million patients were registered in Germany, Italy, France, Great Britain, Spain and 383 million in Russia, Brazil, India and China. A significant increase in the frequency of OA can be explained by the rapid aging of the population, the obesity pandemic. The prevalence of OA in Russia, according to epidemiological survey data, is 13% [8]. It also became obvious that OA is an elderly disease, the prevalence of which increases after the age of 60, compared with the frequency of its development in middle-aged people by half [1]. At the same time, early diagnosis of knee joint lesions is difficult in many cases, which complicates the selection of the most rational therapeutic and rehabilitation measures and assessment of working capacity [3]. From a modern perspective, OA is considered as a heterogeneous group of diseases of various etiologies with similar biological, morphological and clinical outcomes, which are based on damage to all components of the joint: articular car-

tilage, subchondral bone, ligaments, capsule, synovial membrane and periarticular muscles [6,9,10].

Today, ultrasound of the knee joints in order to detect degenerative and inflammatory changes is one of the most promising methods of radiation diagnosis, in some cases it can be an alternative to MRI [7]. Having a number of undoubted advantages - non-invasiveness (unlike arthroscopy), accessibility of this method, simplicity of research, cost-effectiveness - traditional radiography can no longer fully meet the needs of modern medicine in the early diagnosis of knee joint diseases, since in most cases the changes detected on the radiograph allow to determine the lesion of the knee joint when involved in the pathological process bone elements, and often these changes are already irreversible and difficult to treat [5,6,11].

Recently, much attention has been paid to the technique of ultrasound examination (ultrasound) of the osteoarticular system [7,8,12]. The use of ultrasound in arthrology is a relatively new direction and quite promising. Currently, ultrasound is one of the most informative methods of imaging examination. Due to portability, accessibility, speed of execution, relatively low cost and almost complete absence of contraindications, ultrasound is an effective method not only for diagnosis, but also for evaluating the quality of treatment [2,4]. This method is highly informative in the visualization of the tendon-ligamentous apparatus, hyaline cartilage, cortical bone layer and paraarticular soft tissues, which significantly expands the therapeutic and diagnostic capabilities of a rheumatologist and allows monitoring the

effectiveness of treatment. Ultrasound of the musculo-skeletal system significantly increases the diagnostic and therapeutic capabilities of the clinician.

Purpose of the study

Assessment of the informativeness of ultrasound in the diagnosis of gonarthrosis.

Material and methods

To determine the normal ratio of anatomical structures of the knee joint, 30 healthy individuals aged 30 to 55 years (control group) were examined. Ultrasound examination in 30 patients allowed us to determine the criteria necessary for the diagnosis of the disease, depending on the stage of the process. The average duration of the disease ranged from 2 to 5 years. The studies were carried out according to the generally accepted percutaneous technique by multi-position scanning above and below the patella along the lateral surfaces of the knee joint. Patients also underwent X-ray examination using standard methods for comparison.

Results

It is traditionally believed that degenerative changes begin in articular cartilage and degeneration of chondrocytes. Therefore, special attention was paid to changes in articular cartilage during ultrasound.

In the control group, the articular cartilage looked like a hypoechoic strip with clear medium-wavy contours on the articulating surfaces of bones with a diameter of 4.0 ± 0.6 to 6.0 ± 0.1 mm. Uneven thickening of articular cartilage was revealed in two patients at the first stage of the disease. There were no X-ray changes in the joint in this group of patients (Fig. 1).

In pathology, deformation of the tibial head manifested itself in the form of a violation of its sphericity, unevenness, discontinuity and changes in the curvature of its contours. Signs of sclerotic changes in the capsule manifested themselves in the form of an increase in the echogenicity of the capsule, the unevenness of its contours (Fig. 2).

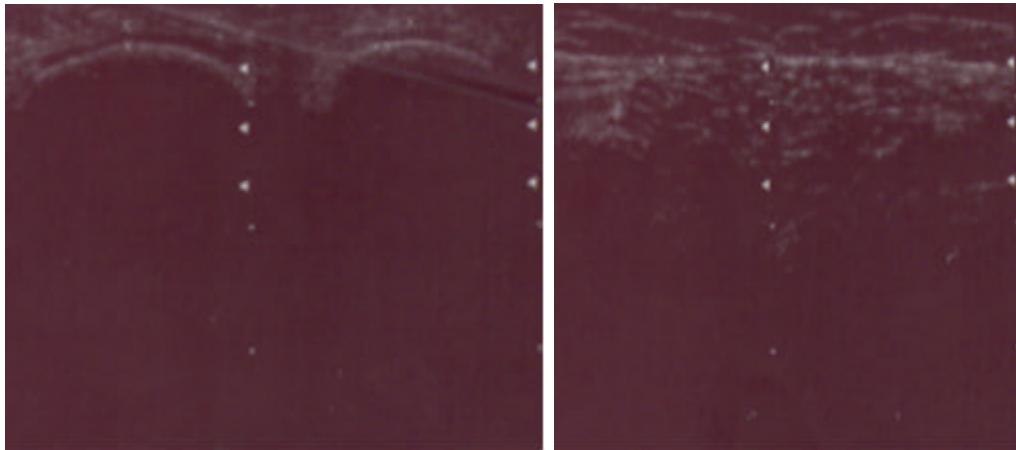


Fig. 1. Ultrasound of the anterior muscle groups and knee joint is normal states.

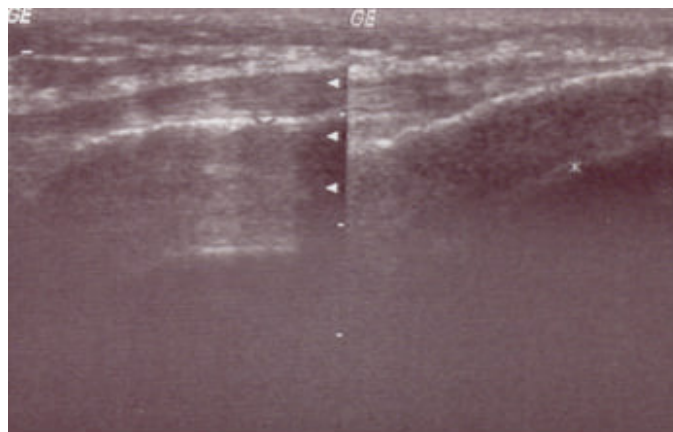


Fig. 2. Ultrasound of the knee joint in patients with stage II gonarthrosis.

Uneven thinning of articular cartilage with the presence of hyperechoic inclusions with deforming osteoarthritis of the knee joint, the thickness of hyaline cartilage decreases accordingly to the stage of the process, usually uneven, the presence of hyperechoic inclusions. In 14 (70.0%) patients at the second clinical stage of the disease, the cartilage echostructure was heterogeneous, hyperechoic inclusions were determined (Fig. 3).

In 3 (15.0%) subjects with the third stage of the disease, hyaline cartilage had the appearance of a hyperechoic

strip with a large-wave surface with a diameter of up to 2.2 mm. Hyaline cartilage was not visualized in three patients, mainly in the medial parts of the joint (Fig. 4).

With deforming osteoarthritis of the knee joint, the thickness of hyaline cartilage decreases accordingly to the stage of the process, as a rule uneven, the presence of hyperechoic inclusions, mainly cartilage decreases more on the medial condyle in accordance with the greater mechanical load on this area.

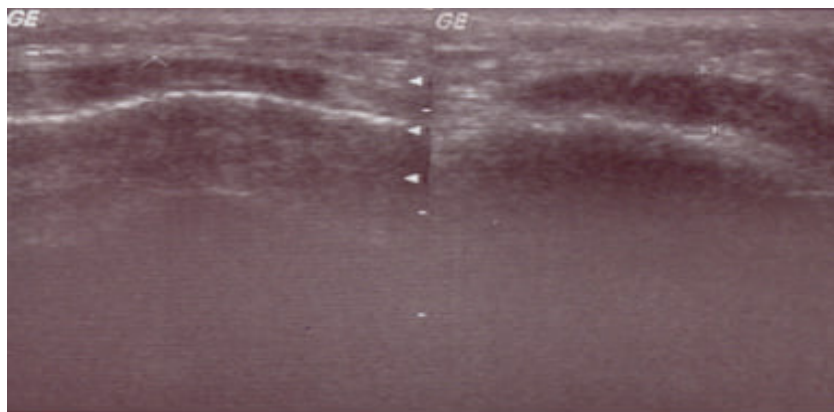


Fig. 3. The second stage of gonarthrosis with the presence of hyperechoic inclusions.

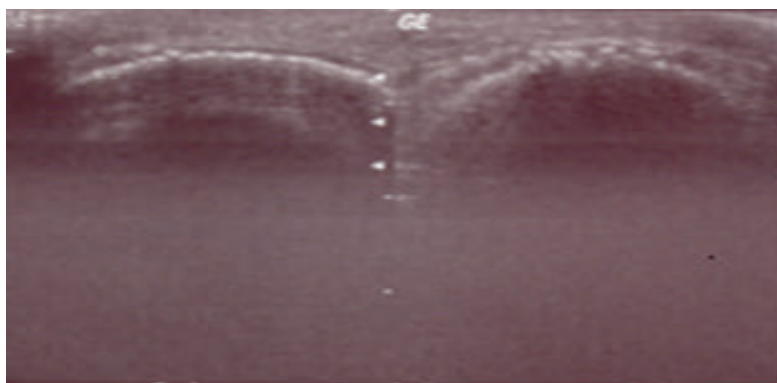


Fig. 4. The third stage of the disease, with the presence of hyperechoic inclusions, hyaline cartilage is non-visualized in the medial parts of the joint.

As diseases develop and the stage of the process changes, cartilaginous detritus with antigenic properties was formed on the articular surfaces. This caused inflammation of the synovial membrane and its fibrosis. As a result, the synovial membrane produced defective fluid, which in turn worsened the nutrition of cartilage, followed by its degeneration.

The analysis of radiographs of the same patients mainly revealed gross changes and bone changes. Also, the condition of the periarticular tissue was not visualized.

Discussion

The X-ray method gives an idea of the thickness of articular cartilage according to the degree of narrowing of the articular gap and bone changes characteristic of OA, but does not allow to assess the condition of the periarticular structures of the knee joint. X-ray changes reflect the outcome of the process, but do not allow us to judge its activity and dynamics. A number of authors point to an equally important influence on the severity of the articular syndrome and the nature of the course of OA periarthrosis, in particular tendinitis of the muscle tendons surrounding the knee joint. The condition of the musculoskeletal system was previously possible to determine only with arthroscopy. Literature data indicate the need to use ultrasound of the joints in order to objectify the condition and assess the dynamics of the inflammatory process in gonarthrosis. Ultrasound makes it possible to clarify the localization and severity of the inflammatory process in synovial bags, periarticular tissues, which significantly complements the data of X-ray examination.

Conclusions

1. X-ray and ultrasound examination methods complement each other and significantly improve the quality of diagnosis of degenerative-dystrophic and inflammatory diseases of the knee joint. Ultrasound examination better detects early pathological changes and clarifies the stage of the process.

2. The advantage of ultrasound of the knee joint is accessibility, cost-effectiveness, lack of radiation exposure to the patient, the ability to visualize soft tissue components of the joint, which allows to identify early signs of lesions that are practically not determined by radiography.

3. One of the advantages of ultrasound examination of the knee joint is the ability, on the one hand, to diagnose deforming osteoarthritis at the onset of the disease and determine the stage of the process, on the other - to carry out differential diagnosis with other diseases (more often inflammatory). In addition to these changes, ultrasound allows you to evaluate the structure of hyaline cartilage, its surface. And what is especially valuable is the visualization of the suprapatellar sac, the study of which is especially informative for the diagnosis of degenerative-dystrophic and inflammatory lesions.

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ULTRASOUND EXAMINATION IN THE DIAGNOSIS OF OSTEOARTHRITIS

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Objective: To assess the informativeness of ultrasound in the diagnosis of gonarthrosis. **Material and methods:** To determine the normal relationship of the anatomical structures of the knee joint, 30 healthy individuals aged 30 to 55 years were examined. The studies were carried out using the generally accepted percutaneous technique with multiposition scanning above and below the patella along the lateral surfaces of the knee joint. **Results:** In the control group, the articular cartilage had the appearance of a hypoechoic strip with clear, medium-wavy contours on the articulating surfaces of bones with a diameter of 4.0 ± 0.6 to 6.0 ± 0.1 mm. **Conclusions:** One of the advantages of ultrasound of the knee joint is the ability, on the one hand, to diagnose osteoarthritis at the onset of the disease and determine the stage of the process, on the other hand, to carry out differential diagnosis with other diseases.

Key words: ultrasound examination, knee joint, osteoarthritis.

