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ULTRASONIC EXAMINATION OF INJURIES OF THE KNEE JOINT

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ABSTRACT: Ultrasonographic studies were performed in 150 patients with complaints of pain in the knee joint aged 45 to 65 years (mean age 45 years). Traumatic injuries were identified, such as fractures of the bones of the joint, ruptures of the tendon of the quadriceps femoris, rupture of the lateral ligaments and the own ligament of the patella, ruptures of the meniscus, as well as changes that may be accompanied by these injuries. The semiotics of damage to the elements of the joint and post-traumatic changes is described.

Key words: knee joint, trauma, diagnostics, sonography.

Reliable diagnosis of injuries and post-traumatic changes in the elements of the knee joint plays an important role in achieving successful treatment, and underestimation of their changes leads to the development of disability in 75% of cases. The knee joint is damaged quite often. The study of the literature indicates that there is little evidence-based information about the differential diagnosis of the pathology of the knee joint. Many scientific publications show the main aspects of the use of ultrasonography in the diagnosis of injuries and other changes in the structures of the knee joint. However, the problems of complex radiation diagnostics of the pathology of the soft tissue structures of the knee joint remain insufficiently studied. So far, there are no data on a comparative analysis of the diagnostic effectiveness of ultrasonography and radiography in damage to the soft tissue structures of this joint. Indications for the use of radiodiagnosis methods have not been defined, and a diagnostic algorithm for clinical and radiological examination of patients with damage to the soft tissue and bone structures of the joint has not been developed. Examination of the knee joint by using digital radiological and ultrasonographic methods; the development of differentiated criteria for various types of joint pathology and their implementation in practical healthcare, in our opinion, is one of the most important preventive areas in the protection of public health. The advantages of ultrasonography are the ability to obtain layered images in real time, which allows for multi-projection scanning,

unlimited research time, non-invasiveness and accessibility. Despite the significant progress made in improving diagnostic methods, the percentage of diagnostic errors is 27-31%. Insufficient illumination of damage to the elements of the knee joint and their high frequency determine the relevance of the problem and require the improvement of radiation diagnostics.

The purpose of our study is to improve the diagnosis of traumatic and post-traumatic changes in the elements of the knee joint.

MATERIAL AND METHODS

The basis of scientific research on this topical issue is the results of a comprehensive clinical, ultrasound, radiological examination of patients with various types of traumatic and post-traumatic changes in the structures of the knee joint.

Ultrasonographic studies were performed in 155 patients (215 joints) with complaints of pain in the knee joint aged 45 to 65 years (mean age 45 years). Ultrasound diagnostics was carried out with the SONOSCAPE S50 apparatus by the polypositional method by using a multi-frequency linear probe with 7-12 MHz. When performing sonography of the knee joint, we complied with the mandatory requirements. First, the position of the patient on the back, the knee joint is examined first in a slightly bent position of the joint of about 30 degrees and in the extended state, then the patient is examined on the stomach with the limb extended.

RESULTS AND DISCUSSION

Based on the study of the research results, we have identified ultrasonographic changes in the knee joint with its injuries and compiled the following semiotics.

In case of fractures of the bones of the joint, their hyperechoic contours are interrupted with the presence of hypo- or anechoic. Ultrasonographic studies of damage to the knee joint with a strip or area, and when the fragments are mixed, the hyperechoic contour is deformed. With fused fractures, we noted hyperechoic deformed contours at the site of the lesion. The rupture of the quadriceps muscle of the thigh was visualized with a heterogeneous structure, while there was a violation of the course of the fibers, the presence of anechoic areas - hematomas, thickening of the muscle layers. Its partial rupture was characterized by the presence of microhematomas and thickening of the muscle. Rupture of the tendon of the quadriceps femoris: its contours are not even, the structure is heterogeneous, with the presence of anechoic areas, hematomas, violation

and interruption of the course of the fibers, thickening of the tendon. Partial rupture of the tendon of the quadriceps femoris - the contours are even or uneven, sometimes the contour is interrupted on one side, the structure is heterogeneous, with the presence of anechoic microareas - microtears, hematomas, violation and interruption of the course of the fibers, thickening of the tendon. With chronic injuries at the site of the lesion, compaction and structural disturbance with the presence of areas of hyperechoic inclusions were noted.

At ra in ruptures of the lateral ligaments and the patellar ligament, the following picture was differentiated: the contours were uneven, the structure was heterogeneous, with the presence of anechoic areas, hematomas, deformation and interruption of the course of the fibers, thickening of the ligament. Partial ruptures of the lateral ligaments and the patellar tendon's own ligament looked with even or uneven, sometimes intermittent contours on one side, while the structure was heterogeneous, with the presence of anechoic microareas - microtears, hematomas, the course of the fibers was disturbed and interrupted, the ligaments thickened. In the late periods, the echocardiography at the level of the lesion was noted in the form of a structural restructuring with the presence of moderate deformation of the contours, moderate thinning, and in some cases, compaction of the ligaments.

Suprapatellar bursitis was visualized with even and clear outer contours, while the synovium is often thickened, the inner contour is usually uneven. The suprapatellar bag is expanded and thickened, the internal structure is anechoic, homogeneous or heterogeneous with a suspension of flakes. Infrapatellar bursitis was less common than suprapatellar bursitis. Its contours are always smooth and clear. Capsular thickening has been observed in rare cases. The internal structure of the bursa is usually anechoic with fluid present. In our observation, infrapatellar bursitis resolved faster compared to suprapatellar bursitis. In the presence of bursitis, fluid was also noted in the lateral canals, more often in the medial canal. With frequent bursitis in the long term, we observed the compaction of the capsule. In some cases, in addition to thickening of the capsule, its thickening with pronounced deformation of the contours was detected, which was especially noted at the level of the internal contour.

In our practice, an injury to the fat body was rarely noted (the structure is heterogeneous with the presence of anechoic areas), compacted areas were more often differentiated, which may have

been associated with a previous injury. With post-traumatic degenerative changes, hypertrophy and structural restructuring were more often noted.

A rupture (anterior or posterior horn of the internal or external) of the meniscus was visualized in a very diverse way. The contours are even or uneven - depending on the nature of the fracture line, the structure is heterogeneous with the presence of a fragmentation line in various forms: transverse, Y-shaped, longitudinal or oblique fragmentation line. Sometimes, with transverse fragmentation, the inner part of the meniscus is not visualized, or it was visualized with the presence of diastasis (in the form of an anechoic area with fuzzy contours) - a break like a "watering can handle". Paracapsular ruptures were also noted. In our practice, ruptures in the anterior and posterior horn of the medial meniscus were most often noted. In the remote periods, we noted prolapse of the meniscus with the presence of deformation of the contours, some thinning of it, changes in the structure and the formation of gonarthrosis.

Damage to the X-shaped ligaments caused several difficulties due to the inability to follow the entire length. In this case, the structure is usually inhomogeneous or not visualized; an anechoic area with fuzzy contours is determined at the site of its visualization.

The above changes in the elements of the joint in some cases were accompanied by the following conditions:

Myositis of the quadriceps femoris muscle - while the structure is somewhat reduced echogenicity, its thickening is possible. Tendinitis of the tendon of the quadriceps femoris muscle - the contours are even and clear, the structure is homogeneous, echogenicity may be somewhat reduced, sometimes thickened. Tendovaginitis of the tendon of the quadriceps femoris was accompanied by smooth and clear contours, usually with a homogeneous structure, the presence of an anechoic rim - a small amount of fluid between the tendon and its sheath. Small cystic formations of the tendon of the quadriceps femoris - the contours are even and clear, the structure is heterogeneous with the presence of an anechoic area of a rounded or rounded-oval shape. Ligamentitis of the lateral ligaments and the own ligament of the patella - the contours are even and clear, the structure is homogeneous, echogenicity may be somewhat reduced, thickened; ligamentitis of the X-shaped ligaments - the contours are even and indistinct, the structure is homogeneous, the presence of an anechoic rim.

The cyst of the meniscus is visualized in various ways: 1) against the background of the meniscus, an anechoic area of a rounded shape is determined; 2) against the background of the meniscus, an anechoic area of a round-oval or irregular shape with a deformity of the lateral ligament is determined; 3) cystic degeneration of the meniscus with damage to the lateral ligament; 4) perimeniscal cysts are usually oval in shape, more often located along the lower-outer contour of the meniscus. Cystic changes were more often noted in the area of the anterior horn of the lateral meniscus.

Baker's cyst is visualized at the level of the joint along its posterior surface, more often in the central-inner segment - it manifests itself in various variants: 1) round-oval; 2) longitudinally oval; 3) sickle-shaped; 4) irregular shape with an internal partition. In this case, the internal structure of the cyst is often homogeneous, and the contours are even and clear, less often with the presence of flakes.

suspension and a moderately hyperechoic thickened capsule (in chronic forms). In almost all cases, it was possible to trace the connection ("path") to the joint. Based on long-term follow-up, we noted unicornuate, bicornuate, and tricorneal forms of Baker's cyst.

The presence of chondromic bodies (the number and sizes are different, the acoustic shadow depends on their density, localization - in the articular cavity). This was most often observed in separated periods.

Hygromas are visualized with clear and even contours, mostly round or round-oval in shape with an anechoic internal structure.

An organized hematoma is visualized with clear and even or uneven contours, sometimes with a hyperechoic rim and an inhomogeneous internal structure with the presence of hyperechoic inclusions.

CONCLUSIONS

Based on the observation of sonographic images in patients with trauma and post-traumatic changes in the soft elements of the knee joint, it was concluded that this diagnostic method makes it possible to identify reliable criteria for changes, thereby giving reason to recommend it for widespread implementation in practice to clarify the diagnosis in combination with the X-ray method. The described description of the details of changes in the elements of the knee joint

during its injuries helps to diagnose more completely and reliably, improves the quality of diagnosis, and allows non-invasive and repeated monitoring of treatment.

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