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ULTRASONOGRAPHY OF SYNOVIAL CYSTS AND WRIST JOINT

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Abstract: The aim of the study was to evaluate the effectiveness and feasibility of mandatory ultrasound examination of patients with synovial cysts of the hand and wrist joint.

Keywords: synovial cyst, hygroma, ganglion, tenosynovitis, ultrasonography.

Material and methods: Examination and subsequent treatment of 225 patients with synovial cysts of the hand from 2011 to 2021 was carried out. Diagnosis was performed on the basis of clinical and anamnestic data, radiography results, ultrasonographic examination (USG), intraoperative diagnosis and postoperative histological examination. If necessary, MRI (in 35 (12.8%) patients) and CT (in 7 (2.6%) patients) were also performed. In the presence of clinical signs

of damage to the nerves of the forearm, electroneuromyography was included in the algorithm (in 17 (6.2%) patients).

Results: The operational characteristics of USG in the study of soft tissue neoplasms were: sensitivity — 97.4%; specificity - 99.1%; diagnostic efficiency - 0.96%.

Conclusion: USG in synovial cysts of the hand and wrist joint allows performing topical diagnostics, identifying secondary changes in the surrounding anatomical structures, and establishing the cause of secondary clinical symptoms.

Introduction: Synovial cysts (SCs) are one of the most common reasons for seeking medical attention for hand disorders. In the literature they are also often characterized by the terms "hygroma" and "ganglion". In our opinion, these terms do not reflect the essence and course of the pathological process. The term "synovial cyst" is the most acceptable to describe this pathology. From the point of view of histologists, SCs are degenerative pseudocysts. In contrast to the synovial pouch and synovial joint pockets filled with synovial fluid, the walls of SCs consist of fibrous connective tissue devoid of synovial membrane, and their content is a thick, viscous, gelatinous fluid of various shades of yellow. Synovial cysts can communicate with the joint cavity (articular SCs), with the cavity of the tendon sheath (tendon SCs) or have no communication with the cavity structures (SCs coming from the paraarticular tissues). Among many theories of SC origin, two have gained the greatest recognition. According to the first one, SCs represent hernial effusion of synovial membrane (tendon sheaths, joint capsules) with its subsequent replacement by connective tissue and concentration of fluid contained in it. According to the second theory, the most common one, SCs are formed as a result of degenerative-dystrophic remodeling of periarticular connective tissue, including ligaments surrounding the joint, with subsequent mucoid remodeling of tissues. Tendon sheath SCs are a consequence of pathological changes in the tendon sheath - tenosynovitis. As a result of long-term chronic traumatization and inflammation, local isolated cysts may form in the tendon canal, in which synovial fluid accumulates. At the

stage of initial consultation in the outpatient clinic, there is often a problem of a simplified diagnostic and treatment scheme: the surgeon or traumatologist, based solely on the anamnesis and physical examination data, makes a diagnosis of "hygroma" and then prescribes conservative therapy. Often, only when faced with complications, outpatient specialists send the patient to a specialized department of hand surgery. To date, in the domestic medicine the only method of examination, provided for in the standards of medical care in the system of compulsory health insurance, is radiography. However, its capabilities with soft tissue neoplasms are limited to the detection of concomitant joint pathology. The study of the structure of a mass, as well as its relationship with the surrounding soft tissues, is inaccessible for radiography. This dictates the need to investigate the possibilities of ultrasound method for diagnosing synovial disorders in the hand.

The aim of the study was to evaluate the effectiveness and feasibility of mandatory ultrasound examination of patients with synovial cysts of the hand and wrist joint.

Material and methods: 225 patients with SC were examined and subsequently treated. ICs were more frequent in women than in men: 160 (65.3%) and 65 (34.7%), respectively. Mean age in women (44.6 ± 17.8 years) and men (44.2 ± 17.4 years) did not differ significantly. The duration of the disease ranged from 2 months to 5 years. At the same time the majority of patients turned for treatment 4 months after the appearance of the first symptoms. In 115 (41.9%) patients there was a history of trauma or constant increased load on the affected segment of the hand with numerous microtraumas. Inappropriate physical therapy treatment was performed at the prehospital stage in 155 (63.5%) patients. Diagnostic errors were detected in 110 (44.1%) patients and treatment errors were detected in 160 (73.2%) patients. After previous outpatient treatment 77 (28,1%) patients referred to SC with relapses. Among them 21 (8.7%) patients underwent operative interventions (without subsequent histological diagnostics), and 24 (10.9%) patients - various manipulations: mechanical crushing of cysts, aspiration of its content,

injection of sclerosing agents into cyst cavity. Treatment errors consisted in the absence of immobilization and prescription of physiotherapeutic procedures unacceptable in such cases in 19 (6.9%) patients. Ultrasound was performed in 18 (6.8%) patients before referral to the clinic. Its results in 7 patients did not contain the necessary data. We performed the diagnosis of volumetric masses on the basis of clinical and anamnestic data, X-ray and ultrasound findings, intraoperative diagnosis, and postoperative histological examination. If necessary, MRI (in 36 (12.8%) patients), CT (in 7 (2.6%) patients) was performed to examine the joints. ENMG (in 17 (6.2%) patients) was included in the algorithm if there were clinical signs of forearm nerve involvement. Involvement of nerve trunks in the pathological process was secondary (when SC was located in the nerve projection). Clinical blood and urine tests established the absence of specific changes in all patients. X-rays were used to determine changes in soft tissue volume, shape, contours and sizes of SC, its position relative to skin, bones and joints, the state of adjacent bone and joint structures was studied. HDI 3500 (Phillips), LOGIQ 9 (General Electric), LOGIQ 6 (General Electric), LOGIQ F8 (General Electric), Medison Accuvix-XG with 7-15/12-15 MHz linear multifrequency sensors were used during ultrasound diagnostics. Study results were recorded on thermal tapes of the printer. USG was performed in a certain sequence. Search area was determined on the basis of clinical examination. After detection, external parameters of SC were studied: shape (rounded, oval, irregular), presence of capsule, clearness and evenness of contours, presence of chambers. Further, we studied the internal structure of a SC (echogenicity, homogeneity of structure, presence of internal inclusions) in order to determine its pathomorphological nature: fluid, solid or mixed.

Results: In 235 (87.8%) patients the preliminary report after ultrasound examination performed in our clinic and the results of histological examination coincided. On clinical examination, SC were defined as tumor-like masses of round or oval shape, soft or dense elastic consistency, painless or moderately painful on palpation, and limited mobility. The tendon sheath SCs were small (up to 10 mm),

densely elastic and painful on palpation. Small wrist SCs, including those inaccessible for clinical examination (hidden cysts), were often characterized by a pronounced pain syndrome. According to SC size, we distinguished small (less than 3 mm), medium (3-45 mm), and giant ones (one of the diameters greater than 50 mm). Five synovial cysts were distinguished by giant size. On a sonogram, SC had the appearance of an additional volumetric mass of round, oval or horseshoe shape with clear contours, single or multi-chamber with clear and thin septa. The cyst wall was visualized as an echogenic band. The internal content of a cyst on a sonogram was defined as a homogeneous hypoechogenic or anechogenic "fluid" structure with the effect of subsequent shading. Quantitative data included measurement of SC (or each SC chamber). Scans were performed in two obligatory projections - longitudinal and transverse (relative to limb axis), and arbitrary (relative to formation axis). The palmar SCs originating from the wrist joint had the largest size. SCs of ring ligaments of fingers and tendon sheaths of finger flexors were smaller in size (0.3-0.7 cm). Mobility, the presence or absence of adhesion of the mass with the surrounding tissues were determined by functional tests. For example, when imitating a solid mass due to hypertrophic overgrowth of the cyst's synovial membrane, the probe compression test resulted in a significant elastic change of its shape in case of a cyst.

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