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CORTICAL INDEX OF FEMUR IN INFANTS: MANUAL AND AUTOMATIC DETECTION

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Introduction. The idea that osteoporosis is a problem that worry only adults lost its relevance. It's related with increase number of patients in a population not only due to "aging" population, but also because of "rejuvenation" of the disease. For diagnostic of osteoporosis often use cortical index (CI).

The aim of the study was To compare the results of manual and automatic detection of CI of femur in infants with radiography data.

Materials and methods. We were analyzed children's hips AP radiographs with suspected injury or dysplastic changes without identified pathology. Manual measurement of CI conducted by doctor on digital radiographys. The same radiographys were analyzed using special computer program which was developed by us.

Results. After comparing the results of manual and program measurement of CI of femur in infants was found that the average CI measured visually (0.54 ± 0.05) higher than the same indicators measured by program (0.49 ± 0.05 ; $p < 0.01$). This can be explained that the doctor determines the size of bone marrow cavity as the darkest areas but that does not conform to reality. The program determines size of the bone marrow cavity using special densitogram extremes which conform to the border of cortical layer with the highest absorption of X-rays. That determined the true size of bone marrow cavity. Although that difference between this two measurements exist we can use both indices. Just need take into account that the normal range of CI is shifting.

Conclusions. It's necessary to develop age-regulatory framework indices for program calculation of CI for different bones in children because it allows to objectively evaluating structural and functional state of bone tissue.

COMPARATIVE ASPECTS OF HEMODYNAMICS AND MYOCARDIAL FUNCTION IN PATIENTS WITH ISCHEMIC HEART DISEASE DEPENDING ON PRESENCE OR ABSENCE OF CALCIFICATION OF HEART VALVES ACCORDING TO RADIOLOGICAL STUDY METHODS

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Introduction. Increase of life expectancy, overall aging of the population in most countries has led to increase of the number of diseases that accompany aging. One of these conditions which prevalence will be progressively increased in the XXI century, is a calcification of heart valves. The cause of calcification of heart

valves (CHV) is mainly rheumatic or atherosclerotic lesions. Recently, CHVS becomes more frequent in older patients with coronary heart disease (CHD) and essential hypertension (EH). The presence of calcification significantly increases the risk of violations of both systolic and diastolic left ventricular function and exacerbates the disease.

Study objective was to examine the comparative aspect of hemodynamic status and changes of heart function in patients with CHD with or without CHV.

Material and methods. A comprehensive clinical, X-ray and ultrasonography (US) study of 105 patients with coronary heart disease, stable angina of III-IV functional class (according to the classification of the Canadian Cardiovascular Society) aged between 55 and 80 years was conducted. All patients were divided into two groups: group I — 52 patients with CHD without CHV; group II — 53 patients with CHD and CHV (20 — with aortic valve calcification and 33 with calcification of the mitral valve).

Results. In patients with CHD calcification of mitral valve is defined in 33 patients (55-59 years — 4 patients, 60-69 — 14 patients and over 69 years — 15 patients); aortic valve — 52 patients (in all cases — older than 60 years). It was found that age is one of the main risk factors for CHV with a significant correlation with the age determined for aortic valve calcification as compared with mitral valve. In 26 (78.8%) patients CHD was combined with hypertension. Connection of CHV with hypertension and coronary heart disease may be both due to the occurrence of chronic ischemia and degenerative changes of connective bases of heart valves with their associated diseases, and the relative physiological deficiency of blood supply to endocardium, which progressively decreases along with aging, primarily in the areas of greatest hemodynamic load (fibrotic ring of mitral and aortic valves). According to US data regurgitation was detected in 17 patients, left atrial dilatation, and diastolic dysfunction — in 45 patients, left ventricular hypertrophy — in 39 patients. The frequency of these symptoms at comparison was by 11.7%, 20% and 15.4% higher than in patients without valves calcification. Ejection fraction was similar in both groups. Among the patients with CHV the vast majority had eccentric left ventricular hypertrophy (LVH) — 79.3%, concentric LVH — 9.4% and concentric remodeling of the heart — 11.3%. 36.5% of patients with CHD without CHV had normal heart geometry, 28.8% — eccentric, 23.1% — concentric left ventricular hypertrophy, and 11.6% — concentric remodeling of the left ventricle cavity. Thus, patients with CHD and CHV compared with patients without CHV had more significant remodeling process directed towards LV dilatation and impaired systolic function. Review chest x-ray images in patients of group I in 75% cases showed no change, 25% — signs of venous stasis in the pulmonary circulation (PC). In group II hemodynamic changes in PC were absent in 13.2% cases (7 patients). Signs of venous stasis of varying

severity were revealed in 60.4% cases (32 patients). The latter were caused by redistribution of pulmonary blood flow due to functional failure of LV caused by different reasons. Remaining 14 patients (26.4%) showed signs of central pulmonary arterial hypertension which appearance was due to CHV with the narrowing of the valve orifice rings (usually of the mitral valve) and EH. These radiographic studies correlate with the clinical assessment of heart failure (mainly III-IV functional class according to the classification of the New York Heart Association (NYHA)).

Conclusions. Thus, patients with CHD and CHV have more pronounced left ventricular dilatation with reduced systolic function, as evidenced by the higher class of heart failure (III-IV degree by NYHA.). The findings suggest that the combination of CHD and CHV can lead to more significant negative changes in hemodynamics in PC.

UTILITY OF INTRAVAGINAL ULTRASOUND GEL FOR MRI EVALUATION OF CERVICAL CANCER

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Introduction. Cervical cancer remains among the leading causes of cancer-related death in women. In the Republic of Moldova it represents the second most frequent cancer in women after breast cancer. Accurate staging provides important information about the disease extent and anticipated response to treatment. For instance, the presence of parametrial invasion makes radiation therapy rather than surgery the preferred treatment. MRI is ideal for the delineation of cervical tumors and is now an integral part of local staging. The modality is especially useful in the diagnosis of parametrial invasion and plays an important role in the selection of therapeutic regimens, including surgical interventions or radiation therapy. Although direct lateral extension into the parametrium is rather easily recognized, the visualization of lesions that spread eccentrically into the lower portion of the cervix may prove really challenging.

Aim. The purpose of the study was to assess whether application of aqueous intravaginal ultrasound gel can improve visualization and disease staging in patients with carcinoma of the uterine cervix undergoing a pelvic MRI exam.

Material and methods. The study included 92 patients aged 21-72 years with cervical cancer investigated in the period February 2013 – December 2016. All patients underwent a formal pelvic MRI exam with and without intravaginal gel for evaluation of their disease extent. MRI findings were analyzed according to the MR criteria for staging of cervical cancer and were correlated with the biopsy results, as well as with the intraoperative findings when applicable. Sensitivity and specificity were calculated for different parameters.

Results and discussion. In our study, intravaginal ultrasonographic gel significantly improved the visualization and delineation of cervical lesions on pelvic MRI. Thus, in patients using intravaginal gel stage IIA disease was accurately diagnosed in 11 patients (versus 2 patients without gel application), stage IIB disease — in 18 patients (versus 16 patients without gel application),

stage III disease — in 11 patients (versus 5 patients without gel application) and stage IVA disease — in 6 patients (versus 4 patients without gel application). The detection rate appeared similar with and without intravaginal gel application in patients with stage I (21 patients) and stage IVB (19 patients) disease. Overall, the application of intravaginal ultrasonographic gel increased the accuracy of pelvic MRI for cervical carcinoma staging from 72.8% to 93.5%, demonstrating a particularly high sensitivity for detecting vaginal invasion (100% in our study.) It also increased the inter-observer agreement from 71% to 90%.

The gel was well tolerated by all patients. Due to its aqueous content, the ultrasonographic gel appeared as a highly hyperintense material on T2-weighted sequences, substantially increasing the contrast between the tumor (commonly appearing slightly hyperintense on T2-weighted sequences) and the vaginal wall (appearing hypointense on T2-weighted sequences). In addition, gel application appeared to provide a better distention of the vagina with an improved visualization of its upper portion and fornices.

Conclusion. Pelvic MRI with administration of intravaginal gel is well tolerated and provides valuable information related to disease extent in patients with cervical cancer, having a particularly high sensitivity for detecting vaginal invasion. Intravaginal gel application significantly improved disease staging in patients with stages IB, II, III and IVA, demonstrating an overall accuracy of over 90%. Apart from increasing the contrast between the tumor and vaginal wall, gel application provides a better distention of the vagina with an improved visualization of its upper portion and fornices.

OPTIMIZATION OF CLINICAL BREAST MR IMAGING ON 1.5-T SYSTEM: ADJUSTING SCANNING SEQUENCES TO SUSPECTED PATHOLOGY FOR SHORTENING IMAGING TIME

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Introduction. Breast MRI is a powerful tool for breast imaging. Various imaging protocols are available and additional information can be obtained while increasing the imaging time.

Aim. The study aimed to emphasize the role of optimizing breast magnetic resonance imaging (MRI) protocols to individual patients depending on suspected pathology.

Material and methods. In this study we performed 170 contrast enhanced breast MR investigations in an attempt to minimize the imaging time by adjusting scanning sequences to suspected breast pathology.

Results and discussion. A T2-weighted sequence without fat saturation was applied first to identify any cysts or microcysts, since a T2 signal greater than that of non-saturated fat has a good predictive value for a cyst being benign. A T2-weighted sequence with fat saturation, on the other hand, was applied in patients with nipple discharge and suspected malignancy for obtaining indirect MRI ductography images and optimizing the detection of small cancers. This was followed by a T1-weighted sequence for detecting the presence of a fatty component or biopsy markers within a lesion and by