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BIONUCLEAR CONFORMANCES RECORDED IN PRECIOUS DIAGNOSIS OF INTERVERTEBRAL DEGENERATIVE DISEASES

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Abstract

Lumbar pain is a complex, multiple-faceted medical problem that has effects not only on physical well-being, but also on the psychological, emotional, social, and financial aspects of the individual's life. Although many other tissues may be involved, lumbar intervertebral disc damage remains an important cause of low lumbar pain and lower limb radiculopathy. Degenerative lesions of the intervertebral disc affect especially young people in full activity. The shape and functionality of the intervertebral disc influences not only the mobility but also the whole set of functional spinal performances, its exploration and detailed knowledge being essential for understanding the pathological changes of the axial organ.

The study aims to highlight the importance of markers of diagnosis and evolution of the herniated disc useful in the assessment of the therapeutic decision.

Research is doing its job by demonstrating the importance of detecting changes and localization of the hernia with a predictive role on evolution and implicitly on treatment that can only be beneficial for medical practice.

Key words: modified intervertebral disc, herniated disc, diagnostic methods in HDL, type of collagen.

INTRODUCTION

The purpose of the research was to highlight the biological and biochemical changes in the intervertebral discs obtained through discectomy. The biochemical study of the intervertebral disc has as objective the determination of glycosaminoglycans and collagen in the intervertebral disc compartments determination of chondroitin sulphate and keratosulfate as degradation products of glycosaminoglycans and the keratosulfate / chondroitinsulphate ratio change detection of the pulp nucleus metacromase reduction. The electronic microscopy shows the 11 types of collagen of which only 6 are present in the intervertebral disc.

MATERIAL AND METHOD

After analyzing the clinical, MRI, histochemical and biochemical data, of the 47 cases, we performed a clinico-imaging staging of intervertebral disc lesions, which corresponds to a biological staging. The imaging staging offered by MRI was based on the classification made by Modic (Type I, II, III).Our contribution consisted of the biological staging of intervertebral disc lesions correlated with the MRI lesions described by Modic.Thus, the three major types of changes in the intervertebral disc and vertebral disc were determined.I. The first type of MRI changes was highlighted in a number of 16 patients (15.55%) studied, of which 4 (8.5%) were operated, consisting of:

• the vertebral bodies parallel to the vertebrae of the degenerate disc exhibit a reduced intensity signal on T1 weighted images and increased intensity in T2. In two cases, contrast substance (Magnevist) was used, reflecting vascular changes in the fibrous marrow.The histopathological changes revealed in the incipient forms of intervertebral disc degeneration, identified in 5 (10.63%) operated patients, were as follows:- mixedoid degenerescence in the discard cartilage with condroblasts and chondrocytes at the center of the image;- hyalinization as well as areas of interfibrilary edema on fibrous disc tissueII. Type II MRI changes that were identified in a total of 23 cases (22.33%) studied, of which 5 (10.63) were operated, were as follows:• Increased signal strength on T1-weighted images and an insignificant or slightly hyperintensive signal on T2 images, the disc imaging expression of discal lesions consisting of protruding pulse nucleus and relatively early incipient disc hernias.

Histopathological changes - second phase

• in the middle forms of intervertebral disc degeneration, found at 13 (27.65%):

- discal cartilaginous tissue with chondrocytes in papilled-like condroblasts and hemorragic areas

- chondrocytes with chondrocytes associated with the mixedoid degeneration area.

III. The Type III MRI changes identified in a total of 64 cases (62.13%) of which 38 were operated were as follows:

• Decreased signal intensity on weighted images in both T1 and T2 being correlated with extensive bone sclerosis visualized on conventional planar X-ray imaging, whereas type I and II changes have no radiological correspondence.

Histopathological changes - type three, in advanced forms of intervertebral disc degeneration, found in 29 cases (57.44%)

- mixedoid degeneration and intradiscal calcifications

- Hyaline discal cartilage with intradiscal calcification areas and the presence of young fibroblast and condroblast cells- cartilage tissue with fibrosis zones and chronic inflammatory infiltration.

The electron microscopy study performed on disk fragments obtained by discectomy revealed qualitative and quantitative changes of all types of collagen at the three anatomical structures of the intervertebral disc corresponding to the MRI changes.

RESULTS AND DISCUSSION

In dissections that correspond to MRI and type I histopathology in 6 cases (12.76%) the electronic microscopy revealed in the intervertebral disc the following changes:
• minimal absence / increase of collagen I and II in pulpos nucleus
• Growth with a slight change of collagen I, II, III, IV in the fibrous ring
• the absence of collagen I in the vertebral plates and the presence of Type II collagen in the vertebral plates
In dissections corresponding to MRI and type II histopathology in 7 cases (14.89%), the following changes were noted in the electronic microscopy:
• the growth of type III collagen in the heart nucleus
• Moderate presence of type V collagen, much better represented by type III collagen
• the presence of collagen type III, V, VI on the vertebral plates.
In 34 cases (72.34%) disc dissections correspond to MRI and type III histopathology, the following changes were made in the electronic microscopy:
• Decrease of all types of collagen in cartilage plaques with the presence of six types of collagen in pulpos nucleus and fibrous ring (I, III, IV, V, VI, X) with attenuation and disappearance of proteoglycans. At this stage, a number of changes (degradation, collagen cracks)

CONCLUSIONS

• Histopathological aspects evidenced in less than 1/10 of the intervertebral discs analyzed showed mixedoid degenerescence corresponding to the incipient forms.
• Median degeneration of the intervertebral disc was found in 1/10 of the intervertebral discs, the histopathological changes identified were: fibrous disc tissue with interfibrillation edema; cartilaginous disc tissue with chondrocytes in condroplasts, papillary and hemorrhagic areas; dissected cartilage tissue with hyalinization zones.
• 4/5 of the disks analyzed had advanced forms of intervertebral disc degeneration: hyaline dissection cartilage +/- intradiscal calcifications or ossification areas; Chronic inflammatory infiltration at the disc cartilage level
• In more than 1/2 of the subjects, the histological examination confirmed advanced degenerative lesions of the intervertebral disc
• An important element highlighted by us was the identification of young cells (fibroblasts) in the degenerative lesions, thus providing the possibility of repair of the discillary lesions
• Herniated discs are characterized by the overall decrease in mucopolysaccharides and the increase of collagen in parallel with the duration of the clinical development of the case.
• Analysis of biochemical composition of the intervertebral disc showed: in 1/5 of the presence of keratosulfate and condrointinsulphate in approximately equal percentages, in 7/10 a nearly 2/1 increase of keratosulfate, and in 1/8 an increase to 3 / 1 of keratosulfate over condrointin sulphate.
• The electron microscopy study performed on disk fragments obtained by discectomy revealed qualitative and quantitative changes of all types of collagen at

the three anatomical structures of the intervertebral disc corresponding to MRI changes.
• Clinical-imaging staging of intervertebral disc lesions is a biological staging.

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