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(monograph)

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CONTENT

Annotation

The monograph is devoted to the normal structure of the intervertebral disc, protrusion, pathomorphological changes and morphometric indicators of hernia and sequestered hernia. The normal histological structure of the intervertebral disc was consecrated by studying histological and histochemical methods from cadaveric material. The main goal of the book is to enrich information on morphological changes and morphometric parameters of protrusions, hernias and sequestered hernias developing in the tissue structures of intervertebral discs.The pathomorphological changes presented in the monograph are considered by orthopedic traumatologists and neurosurgeons as the main fundamental data in the diagnosis, treatment and surgical procedures for these diseases.

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LIST OF CONDITIONAL TERMS AND SYMBOLS

PN - pulpous nucleus
IVD - Intervertebral disc
COAOCF - Coefficient of activity of collagen fibers.
COAOC- coefficient of activity of chondrocytes
FR- fibrous ring
CF - collagen fibers
MRI - magnetic resonance imaging
CC -chondrocyte cells
IS-intermediate substance
II- inflammatory infiltrate
C – calcification
FON-foci of necrobiosis

FOREWORD

Degenerative-degenerative diseases of the spine in the structural-functional type are manifested in the form of serious diseases such as intervertebral hernia, osteochondrosis, radiculitis. According to experts, among chronic diseases of the human body, there is a growing number of protrusions and hernias of the spine. These diseases are characterized by a higher incidence in the third and fifth decades of human life expectancy, especially in women than in men. Today, despite the creation of modern procedures for the diagnosis and treatment of spinal protrusion and hernia, the incidence of the disease is increasing dramatically. Therefore, taking into account changes in the pathomorphological indicators of spinal protrusion and hernia among different segments of the population, the implementation of an early diagnosis and effective treatment system, improvement of the pathomorphological diagnosis system is one of the most important issues in fundamental medicine.

In world medicine, a number of scientific studies are being conducted to improve the system of early treatment of degenerative diseases of the spine by diagnosing the pathomorphological signs of disc protrusion and hernia, which are structural and functional types. In this regard, research to improve the diagnosis and treatment of hernia-specific morphological changes, pathomorphological processes due to spinal degenerative disease and changes in pathological tissue structural units, complications due to specific morphological pathologies associated with histotopography of spinal vessels, cortex and core layers is being carried out.

Certain measures are being taken in the country to establish a health care system that will radically increase the quality, efficiency and popularity of medical care, including the quality of diagnosis, treatment and prevention of various neurosurgical diseases. Decrees of the President of the Republic of Uzbekistan No. PF-4947 of February 7, 2017 "On the Strategy for further development of the Republic of Uzbekistan", December 7, 2018 No. PF-5590 "On comprehensive measures to radically improve the health system of the Republic of Uzbekistan", This monograph serves to some extent to implement the tasks set out in the Resolution of the Government of the Republic of Uzbekistan dated June 20, 2017 No PP-3071 "On measures to further develop the provision of specialized medical care to the population of the Republic of Uzbekistan in 2017-2021" and other regulations.

I - CHAPTER.
MODERN INTERPRETATION OF STRUCTURAL-FUNCTIONAL TYPES OF DEGENERATIVE-DYSTROPHICAL DISEASES OF THE SPINE

§1.1. Development of the spine in embryonic, childhood and adolescence, development of genetics, age-related anatomy and histotopography of the intervertebral disc.

The spine and spinal cord are responsible for ensuring the movement of the human body, the structural integrity of the body, standing, and transmitting signals from the brain through sensory and autonomic pathways. To perform these functions, the spine and spinal cord are made up of different tissues. The embryological development of the spine and spinal cord has a complex structure and very complex processes. Despite the great achievements of medical biology in recent years, the mechanisms of embryonic development of these organs are not fully understood. Any changes in the stages of development of this system disrupt the normal development and can lead to the formation of various anomalies, resulting in the development of neurogenic dysfunctions and increased injury of structural structures [1; 14-18-b., 11; 36-41-b., 69; 607-b., 169; 652-657-b.].
Early embryonic period and genetics of the spine. The formation of the spine and body skeleton begins during gastrulation, in which the bilaminar embryonic disc becomes the trilaminar embryonic disc. This process begins in the third week of gestation and occurs with the intussusception of ectodermal cells into primary embryonic bands and the appearance of embryonic mesoderm. At the caudal end of the primary embryonic band, a concentration of invading embryonic cells of the mesoderm forms the primary pit and nodule. The continuous and chaotic proliferation of mesoderm cells around the primary node results in the formation of a chondroid tube. These invaginated cells move in a cranial direction, forming a chondroid plate, which then becomes a chord. Chord-forming cells are controlled by 4-fibroblast growth factor and 8-fibroblast growth factor. The formation of a chord causes the proliferation of ectoderm cells in it to form a nerve plate. Approximately on day 19 of gestation, this ectodermal tissue coalesces to form a nerve ending, then its end is closed and becomes a nerve tube. The chord, in turn, plays a key role in the embryonic development and maturation of the spinal cord [69; 607-b.].

Invaginating cells migrate laterally and differentiate into three main parts; paraxial, intermediate, and lateral mesodermal plates. These mesodermal plates develop to form the spinal cord, genital system, and digestive tract. Paraxial mesoderm forms a pair of 42-44 somites within a few days. Somites develop from

the cranial and caudal ends, and their number determines the age of the embryonic period. These structures are an example of the embryonic concept of metamethas, formed anatomically in a linear order to form organs and tissues with complex structures. Each segment of these structures is then differentiated into two areas. The dorsolateral part of the segment is composed of dermatomes and myotomes, which eventually form the shoulder muscles and skin surface, respectively. The ventromedial part of the segment, the sclerotomas of the somite, forms the human spinal cord [4; 122-129-b., 10; 54-58-p.].

The ontogeny of the intervertebral disc depends on the coordination of molecular signals from chord and neural tube cells, in which the protein acts as a molecular signal and controls tissue morphogenesis, location, and cell differentiation [59; p. 18, p. 104; 1674-1684, p. 132; 213-b., 146; 1120-1132-b.]. Somite legs develop under minimal influence of Shh- i Wnt-protein signaling pathways. At this time, sclerotoma tissue develops when the Shh-protein pathway is activated [100; p. 1112-1119]. Noggin molecules initially block BMP and actively express chord cells until a fibrous ring appears [103; 414-b.].

Genes in the rax family encode factors that control the processes of polypatent cell migration, apoptosis, comparison, and proliferation in the embryonic period. It is the expression of these genes that primarily limits the population of disc and vertebral body cells [111; pp. 251-266, 152]. [3; 59-67-p.]. As a result of these processes, pathologies in certain genes lead to general congenital anomalies, many more genes have been and are being found [165; Pp. 793-800]. The Rax1 gene is expressed in sclerotome cells during complete formation of the spinal cord and disc. Once these structures are formed, the Rax1 gene is only expressed in the fibrous ring. Another gene, the Sox gene, plays an important role in the development of spinal cord structures [167; 7722-b.]. The Sox5, Sox6, and Sox9 Sox5 and Sox6 genes in these genes are expressed in sclerotome and chord cells during disc development [153; 2503-2512-b.]. These genes are responsible for the synthesis of tissue interstitial matter, i.e., aggregates and type II collagen. When the expression of these genes is impaired, the chorionic cells become apoptotic without the development of the outer membrane of the chord, leading to a disruption of the disc structure. From the beginning of the process, Sox6-gene expression provides type II collagen synthesis in the chord and sclerotome.

The TGF-p gene signaling pathway is also involved in spinal cord and disc development. The TGF-p gene controls the synthesis and dissection of the interstitial component of disc tissue tissue and cell proliferation and differentiation [59; 18-b.]. There are several types of this gene, the TGF-p3 type is actively involved in the synthesis of perichordal membranes and is involved in the development of the fibrous ring. Blockade of TGF-p2type, responsible for type II

collagen synthesis, leads to incompleteness of the pulp nucleus, disruption of the fibrous ring outer membrane, disruption of disc mineralization.
Development of the spinal column. At 4 and 5 weeks of gestation, each spine emerges from metameric segments. When this process is explained by the theory of peresegmentation, each sclerotome is divided into rostral and caudal halves. Each vertebra is formed by the caudal half of one sclerotome and the cranial half of the other sclerotoma. The fusion of these two sclerotomes results in the formation of a single vertebral body. With each formed spine, the segmental artery and nerve travel together. During spinal per segmentation, it is controlled by HOX and Paxgen [59; 18-b.]. It is the axis of the center formed in the chord and eventually breaks down between the vertebrae, forming the pulp nucleus of the intervertebral disc. Sclerotoma cells proliferate and form a fibrous ring. The two centers of chondrogenesis form a single large segment of the chondrogenesis.

These uncles are ossified at 9 weeks of gestation. During the ossification process, three points are identified on each vertebra; one in the center, two in two sections, respectively. Ossification begins in the lower part of the thoracic spine and continues to the cranial and caudal sides. This slow-growing process continues even after the baby is born, so that the vertebrae join together to last until 6 years of age. The lamellae of the fibrous ring attach to the spine through Sharpeev fibers. The fibrous ring and pulp nucleus are enlarged by interstitial appositional growth. Dense lamellar tufts appear at the edges of the disc and are located in a spiral between the two vertebrae [85; 172-b.]. The more peripheral these lamellae are, the weaker they become. The vibrating core is usually composed of an unstructured matrix. The vascular fibers in the fibrous ring supply the matrix with blood until only two years of age. They then regress and the fibrous ring becomes vascularless, the causes of this process remaining unknown. In fact, the intervertebral disc, rich in cells and fibers, needs strong blood circulation, in which the synthesis of macromolecules takes place continuously. Vascular regression in the fibrous ring corresponds to the period of standing and walking of the child [166; 49-90-b.].

Spinal development. As mentioned above, the nervous system develops from a nerve plate that grows inside the spinal canal. In it, as a result of the rapid growth of nerve tissue, the nerve plate strands collect and form a nerve tube. Disorders of neural tube closure can result in a congenital defect, i.e. myelomeningocele. At about 5 weeks of embryonic development, the shoulder and abdomen of a pair of wing and basal plate bulges appear within the neural tube. The borderline lesion disappears from continuous growth at 6 weeks of gestation. The anterior and posterior branches of the spinal cord appear during embryonic growth, in which brain white matter appears at 7 or 8 weeks [59; 18-b.].

Maturation of the spine during childhood and adolescence. The slow growth of the spine in childhood and adolescence serves as a mechanical bullet for the entire axial skeleton. The ossification of the spine continues after birth in the three main centers of the spinal cord. Neurocentral synchondrosis in the area of the legs attached to the spinal body and a single posterior synchondrosis at the end of the spinal arch provide for the growth of the spine and the expansion of the spinal canal. These synchondrosis appear as pale areas on normal radiographs. Spinal canal dilatation reaches its maximum diameter at the age of 6-8 years after the closure of neurocentral synchondrosis. Early closure or asymmetrical growth of these synchondrosis may result in congenital stenosis or scoliosis of the spinal canal.

In newborns, the spine appears to be intact. As the baby grows, these curves are maintained in the chest area. When the back muscles of the neck of the child grow and lift the head vertically, cervical lordosis occurs in the spine. Lumbar lordosis occurs after the child begins to sit, stand, and walk. During adolescence, secondary ossification in each vertebrae occurs at the ends of the axillary, transverse, and joint tumors. These ossifications can be detected and monitored on an X-ray. Incomplete vertebrae can also be seen on computed tomography. These ossifications are completed when the child is 25 years old.

In chordated animals and human embryos, there is a structure called the chord, consisting of a single cell, then a cell axis fiber. In some animals, the chord is preserved in the form of a vertebral skeleton axis. In vertebrates, the chord disappears in the early stages of embryonic development, i.e., it is replaced by the vertebrae and bone of the spine [108; pp. 371-391]. It maintains the length of the spine by adhering tightly to the chord [156; 3622-b.]. It then disappears into the chorus and the pulp becomes the nucleus. A fibrous ring is formed from its outer area [99; 346-350-p.]. It is composed of longitudinally located fibers in the direction of the spinal cord, even during early development. These fibers are the descendants of Sharpeev fibers between the spine and the disc, the outer area of which is rich in fibers and the cells are few. From the inner parachordal area and the remnant of the eccentrically located chord, a resilient nucleus develops. During this process, the center of the spine gradually ossifies, forming a plate that connects between the spinal body and the disc. From this plate, a bony membrane is then attached to the body of the spine [99; pp. 346-350]. When a baby is born, there will be a component of the disc that is involved in all biomechanical movements.

During the embryonic period and during childhood, the intervertebral disc has its own circulatory system. These blood vessels are separated from the vessels passing by the spinal column, enter the fibrous ring through the intervertebral foramina, and spread through the interval of its lamellae to form a network of

capillaries. The intervertebral discs are fed by two vessels: peripheral and central. But these vessels do not enter the disc and its resilient nucleus. Thus, it should be noted that the disc center is fed diffusely in the early stages of development. In fact, the constant upright position of the human body puts a lot of weight on the intervertebral disc, so that the decrease in nutrient inflow affects the intra-disc connective tissue both quantitatively and qualitatively. The ratio of spine and disc thickness to each other changes regularly with age; if it is 1: 1 at birth, then it varies from 3: 1 to 5: 1.

In adolescents, there is also a qualitative change in the intervertebral disc, which invasive changes are indicative of premature aging of the disc. This is followed by a sharp decrease in water content in the disc. In infants and toddlers, the surface of the intervertebral disc has a glassy, gelatinous, oily appearance. By puberty, the center of the disc loses its homogeneity and gelatin-like appearance and becomes dry and fibrous.

In conclusion, it should be noted that changes in the intervertebral disc in the postnatal period, i.e. regression of angiogenesis, decrease in cell population and extracellular matrix, are manifested in the next stage of disc development, its structural units are regularly disrupted and lead to degenerative diseases.

The intervertebral disc (UOD) is a total of 23, part of the vertebral segment, and is a flexible flattened joint between the two vertebrae. . The pulp consisting of a gel-like substance in the center of the intervertebral disc consists of a fibrous ring around the nucleus. The concave disc is a key element in connecting the spinal column to each other and makes up 3 to 1 of its height. The main function of the intervertebral disc is mechanical, i.e., support and cushioning. They provide flexibility in various movements of the spine, ie bending, rotational movement. The average diameter of the disc in the lumbar region of the spine is 4 cm, height 7-10 mm.

The spinal disc has a complex structure, with a vibrating nucleus at its center and surrounded by a fibrous ring around it. The pulp core has ridge plates that cover the upper and lower surfaces. The pulp nucleus consists of a well-hybridized irregularly arranged collagen and radially elastic fibers. By the age of 10, there are sparsely located cells resembling chondrocytes at the border of a well-defined resilient nucleus and fibrous ring. The fibrous ring (annulus fibrosus) consists of 20-25 rings or plates, between which are identified collagen fibers located parallel to the plates and at 60o relative to the vertical axis. Elastic fibers, on the other hand, are located radially relative to the rings and serve to maintain the shape of the disc after movement. Fibrous ring cells are located near the center of the disc, oval in shape, their shape is elongated at the edges and parallel to the collagen fibers. Unlike intervertebral artery cells, disc cells are larger in size, elongated in

shape, and cytoplasmic tumors reach up to 30 μm. The functions of these tumors are not clear, however, they have the property of assuming mechanical stress. The last plate that surrounds the edge of the disc consists of a thin 1mm hyaline ridge located between the spine and the disc. Its collagen fibers are located horizontally.

In a healthy person, the intervertebral disc has blood vessels and nerves at the periphery of the fibrous ring. The last plate of the hyaline arch, which surrounds the base of the disc, has no blood vessels or nerves. 36-b., 13; 50-51-b., 56; 168-b., 101; 267-279-p., 104; 1674-1684-b.].

With age, the border of the fibrous ring with the fibrous ring disappears and becomes fibrosis. Over time, the disc loses its structural elements and the collagen and elastic fibers in the surrounding fibrous ring become disordered. Degeneration processes also develop in blood vessels and nerves. Fragmented proliferation of cells begins in the pulp nucleus. Over time, the cells in the disc die, resulting in a doubling of the number of disc cells in older people. The main component of the mechanical properties of the intervertebral disc is provided by an intercellular matrix consisting of collagen and aggregate (proteoglycan) [8,9]. Collagen fibers provide the strength of the disc and bind it to the spine. Aggrecan, on the other hand, contains chondroitin and keratansulfate, which provide the hydration state of the disc. The amount of proteoglycans, ie chondroitin and keratansulfate in the ring, is 5% and 70% in the fibrous ring and 15% and 80% in the pulp nucleus, respectively. The intercellular space in the matrix is constantly undergoing synthesis and lytic processes. Although the contents of the joint with the disc are morphologically similar to each other, there are some differences. The amount of keratansulfate in the disc is higher than that of protein glycans. Disc aggregates undergo more degenerative changes than articular aggregates [12; 6-16-b., 23; 69-71-b., 46; 96-97-b., 74; 37-45-b., 102; 90009-90014-b., 119; 178-b.].

Let's take a closer look at the structure of the pulp nucleus and fibrous ring. The intervertebral disc plays an important role in the normal functioning of the spine. back) and 5 lumbar regions (lower and back). This serves to strengthen the spine and allow the bones to move without touching each other [1; 14-18-b., 20; 122-128-b., 166; Pp. 49-90]. The amount of keratan sulfate is lower if the core of the pulp is chondroitin sulfate from the glucosaminglicanes in the gel. Chondroitin sulfate proteoglycan macromolecules create a cavity pressure within the disc [11; pp. 36-41, 103; pp. 414, 145; 83-91-b., 105; 177-180-b.]. The high level of imbibition pressure on the disc is caused by the water molecules in it [6; pp. 20-25, 111; pp. 251-266, 109; 336]. The resistance of the pulp core to compression pressure is determined by the hydrophilic properties of proteoglycans. The compressive force acts on the pulp core, causing its internal pressure to increase.

In the intervertebral disc, the pulp nucleus occupies 40% of the area [11; 36-41-b., 12; Pp. 6-16, 21; 199-b., 52; 84-96-b., 108; 371-391-b.].

The fibrous ring consists of fibrous plates arranged concentrically around the pulp nucleus and separated by thin layer matrices or tufts of connective tissue. The number of fibrous plates ranges from 10 to 24. The number of plates in the anterior part of the fibrous ring is 22-24, and in the posterior part it is 8-10. The plates at the front of the fibrous ring are almost vertical, arched at the back. The thickness of the front plates is 600 microns, the back - 40 microns. The plates consist of a tuft of collagen fibers with a thickness of 70 nm. They are in order and in a clear direction. The collagen fibers in the plates are located parallel to the spinal axis. Bundles of collagen fibers in the fibrous ring have a mesh connection with the outer longitudinal ligament of the spinal column. The fibers of the outer plates of the fibrous ring are firmly attached to the limbus area at the edge of the vertebrae and are attached to the bone in the form of Sharpeev fibers. 2002-p.].

The intervertebral disc has plates surrounding the lower caudal and upper cranial vertebrae. It is a hyaline connective tissue composed mainly of chondrocytes and intercellular matrix. It is composed mainly of type II collagen and protein glycans. The collagen fibers are located horizontally, the inner fibrous ring fibers form a network that interacts with this plate, thereby forming a closed wrap around the pulp nucleus.

The thickness of the spine bones and discs varies throughout the day. After resting at night, their height increases, decreasing by the end of the day. The length of the spine during the day varies by 2 cm. When the spine is compressed and stretched, the intervertebral disc is deformed. When compressed, the disc flattens to 1-2 mm and expands to 3-5 mm when stretched. Normally, a physiological bulge is detected in the disc, i.e., as a result of physical exposure, the outer fibrous ring bulges out of its boundary and does not exceed 3 mm. The physiological bulge of the disc enlarges when bent, and shrinks when straightened.

§1.2. Pathological changes of the intervertebral disc

Etiopathogenesis and pathomorphological changes of protrusion, extrusion and hernia The pathological changes of the intervertebral disc differ from the physiological bulges in that it bulges without rupturing its fibrous ring locally, narrowing the spinal canal, and this is called protrusion. Protrusion is derived from the English and French word protrusion, from the Latin word protrudere, meaning "bulge."A hernia is a Latin hernia, in which the internal organs and tissues protrude from physiological holes or pathologically formed holes. The term "hernia" was

first coined by the ancient physician Clavdie Galen. , is the outflow of internal organs.

The main cause of intervertebral disc degeneration is a decrease in the amount of protein glycans in it. This results in aggregate fragmentation, loss of glucosamine lycans, disc dehydration, and decreased osmotic pressure [36; 64-72-p.]. At the same time, the cells in the disc maintain the production of aggregates. The composition of collagen structures varies less than that of protein proteins in the disc. As the absolute amount of collagen in the disc does not change, their different types of components are redistributed. but collagen synthesis by disc cells is preserved. Loss of protein and water in the disc reduces its amortization and base activity [37; 344-b., 52; 84-96-b., 76; 72-79-b., 98; 119-121-b., 106; 121-b., 121; 895-900-b., 168; 520-529-b.]. The height of the intervertebral disc decreases and slowly begins to emerge into the spinal canal. As a result, an incorrect distribution of the weight falling on the central axis of the disc, the wrapping plates, and the fibrous ring gives a sign of pain. Degenerative-dystrophic changes in the intervertebral disc are not limited to, but can spread to adjacent tissues. When the basic function of the disc is reduced, osteoarthritis develops in the joints and reduces the tension of the yellow joints and impairs their elasticity. Dislocation of the disc, arthrosis of the joints, and thickening of the yellow ligaments lead to stenosis of the spinal canal.

It has now been confirmed that intervertebral disc compression is not the only cause of radicular pain, which is why 70% of people do not feel pain when a nerve tumor is compressed with a hernia. It has been hypothesized that in some cases, when a hernia and a nerve bundle touch each other, they are aseptic, i.e., adapt to each other from the development of autoimmune inflammation by disc cells. Another cause of intervertebral disc degeneration is inadequate nutrition of cellular contents. Disc cells are sensitive to oxygen and glucose deficiency as well as pH changes. Disruption of cell function alters the composition of the intercellular matrix, resulting in accelerated degenerative changes of the disc [39; 78-84-b., 45; Pp. 25-28, 59; 18-b., 62; 3-21-b., 74; 37-45-b., 83; 132-b., 116; 1439-1448-b.]. The disc cells are located at a distance of 8 mm from the blood vessels from which oxygen and nutrients come, so nutrition and oxygen saturation are rapidly impaired.

Disorders of disc nutrition are due to a number of reasons: various cases of anemia, atherosclerosis and others. In fact, proper movement of the body leads to an increase in the amount of protein glycans in the disc. This means that when movement is impaired, physical weight gain causes degeneration of substances and cells in the disc.

There are several periods of degenerative-dystrophic changes in the intervertebral disc: period 0 - the disc is unchanged; Stage 1 - 1 in 3 of the inner

circle plates of the fibrous ring are ruptured; Stage 2 - the disc is strongly degenerated, but the outer fibrous ring is preserved, there is no compression of the nerve bundles, the pain radiates to the knee joint; Stage 3 - cracks appeared along all radii of the fibrous ring, the disc bulged, ruptured the outer transverse ligament.

In 1990-1996, Schellhas created a new classification using computed tomography: stage 0 - a contrast agent inserted into the center of the disc does not leave the pulp nucleus; Stage 1 - the contrast spreads to the outside of the resilient nucleus, i.e., from 3 to 1 of the inner fibrous ring; Stage 2 - contrast fibrosis spreads to 3 to 2 parts of the ring; Stage 3 - contrast fibrosis spreads to the outer plates of the ring, pain occurs; Period 4 - Contrast spreads around the disc no more than 30%; Stage 5 - the penetration of the contrast agent into the peridural cavity is observed, which stimulates aseptic (autoimmune) inflammation, nerve tuft compression occurs, radiculopathy is observed.

The intervertebral disc can be anatomically resembled a joint ridge, in that both components of the disc, the pulp nucleus and the fibrous ring, are inserted into the fibrous ridge, the plate covering the vertebral body being the joint surface. The results of pathomorphological and histochemical studies suggest that degenerative changes of the intervertebral disc are included in the multinational process. Underlying disk degeneration is a genetic disorder. Several genes responsible for the quality and durability of bone structures have been identified: including collagen, responsible for aggregate synthesis, genes that control vitamin D receptors, and metalloproteases. The prevalence of degenerative diseases of the intervertebral disc indicates that the genetic disorder has become a systemic process. The onset of degenerative changes is caused by structural changes in the disc as physical weight increases [41; Pp. 89-99, 87; 442-457-b., 145; 83-91-b., 172; 568-576-b.]. Degenerative changes develop from the ineffective development of reparative processes in the disc. The fibrous ring is 1-3 mm thick and has nociceptors in its posterior longitudinal ligament. It has been confirmed that when structural changes develop in the disc, nociceptors enter the fibrous ring and the pulp nucleus. Degeneratively altered disc cells produce pro-inflammatory cytokines: IL-1, IL-6, IL-8, and tumor necrosis factor [14; 246-b., 15; 2-4-b., 18; 19-22-b., 19; 145-152-b., 25; 496-b., 34; 624-b., 56; 168-b., 89; 54-67-b., 109; 336-b., 156; 3622-b.].

The researchers believe that the elements of the pulp nucleus enhance the pain-causing properties of the nerve endings when they connect with the nociceptors at the border of the fibrous ring. The intervertebral disc is strongly associated with the pain reflex, the rupture of the fibrous ring, the degeneration of the disc causing the hernia, is an additional factor in the onset of pain in the nerves. Cells that produce inflammatory agents in the hernia increase the sensitivity of the nerve tumor to mechanical pressure. Most often, hernias occur in the lumbar region of

the spine, i.e., 48% in the L5-S1 spinal disc and 46% in the L4-L5. Rarely in L3-L4 vertebrae (5%) and even less frequently in L2-L3 (1%).

There are different types of protrusion in the direction of the bulge. Circular protrusion - a circular protrusion all around the disc and the protrusions reach 12 mm. Diffuse protrusion - becomes chronic, the person completely loses the ability to work, becomes disabled. Central protrusion - the middle area of the disc bulges, leading to stenosis and compression. Dorsal or posterior protrusion - bulging into the spinal canal, tearing the septum and turning into a hernia in a short time. Protrusion occurs over a long period of time. As a result of degenerative changes, the intervertebral disc changes its structure, flattens, cracks, loses its elasticity. Such a change in the intervertebral space causes inflammation by reacting to the tissues around the disc. It is known that pulp nucleated cells produce cytokines of self-proliferation, leading to the development of inflammation in the tissues surrounding the hernia . During this period of change, the disc bulges into the spinal canal sub- and transligamentously, and if sequestration occurs, loose hernias appear within the spinal canal. Sequestrated hernia is a severe form of the disease in which part of the hernia falls into the spinal canal through a fibrous ring fracture and can move freely up and down.

Anatomical classification of intervertebral disc herniation; a simple hernia of the disc, in which the posterior longitudinal ligament ruptures part of the disc, the pulp nucleus bulges into the spinal canal and occurs in two forms; free disc herniation, the disc component ruptures through the posterior longitudinal ligament, the base of which remains attached to the spinal column; mobile hernia - not connected to the intervertebral space, moves freely in the spinal canal; recurrent hernia of the disc - occurs under the influence of a strong mechanical force on the spine, returns to its original state after the impact is eliminated.

Topographic classification of disc herniation; Intracranial disc herniation - the hernia is located entirely in the spinal canal and is located in three positions: in the dorsal-middle (Group I on Stukey) compresses the spinal and equine tail; b) the pyramidal (Group II according to Stukey) compresses the spine on one or both sides; c) dorsal-lateral (Group III according to Stukey) is the most common type, the spinal cord compresses nerve bundles on one or both sides, disc herniation in the intervertebral space - it arises from the outside of the disc and compresses the nerve bundle in this area, the lateral disc hernia - arises from the most lateral part of the disc, which can compress the spinal artery and nerve.Ventral hernia of the disc - arises from the ventral part of the disc, is of little importance and complication.

Kuznetsov V.F. (2000) types of hernia sequestration in the direction of exit; anterior-lateral hernia - the spine is located in the area of the anterior arch, causing sympathetic syndrome, which can rupture the anterior longitudinal ligament;

posterior-lateral hernia - it tears the posterior surface of the fibrous ring, it occurs in three forms; medianal hernia - located in the midline; paramedianal - located close to the midline; lateral hernia - located near the posterior longitudinal ligament. Occasionally there is a hernia that enters the body of the spine, i.e. Shmorlya hernia.

§1.3. Clinical manifestations and cycles of protrusion and hernia of the spine

During the period when people continue the process of marriage with more sitting during adolescence, school, then the intervertebral disc in the study begins to degenerate. By this time, the blood vessels that supply oxygen and nutrients to the disc are invaded and the disc tissue is fed by diffusion. The first discogenic symptoms begin to appear at the age of 12-20 years.

The next stage of the disease begins to occur in people aged 20-60 years. Morphologically, radial and circular cracks appear in the fibrous ring.Sequestration of the fibrous ring and ligamentous covering plates sometimes occurs, sometimes leading to limited pain or chronic discogenic pain. We consider the development of subsequent degenerative-destructive changes in the clinical signs of L5-S1 intervertebral disc injury. This develops a horizontal deformation of the disc, with every movement of the person, i.e. the bending or rotation of the body, the disc tissue is pushed back into the fibrous ring and can tear it. This type of movement begins to damage the back of the pulp nucleus. As a result, the posterior longitudinal ligament is affected, the sinusvertebral nerve is affected, blood circulation is disrupted, venous stasis develops, the nerve fiber area becomes swollen, and pain and neurological symptoms appear. A decrease in disc thickness, a decrease in the diameter of the intervertebral foramen, and difficulty in venous blood flow compress the nerve and cause pain. In addition to the shrinkage of the disc, the joints around it suffer from a functional deficiency. The fibrous ring can attract external and internal longitudinal ligaments and insert them into the spinal canal, resulting in varicose veins in the peridural space.

The third stage of the disease is observed in old age. The development of changes in prolapse, protrusion and prolapse in the pulp nucleus, fibrous ring and connective tissue stops. After the age of 60, disc tissue loses almost all of its water content, becoming fibrous dense tissue. As a result, the joints become calcified, the intervertebral space is blocked, movement is slowed down. During this period, pathomorphological changes are detected at a strongly developed level. At this age, spondylogenic symptoms are observed as a result of secondary degenerativechanges rather than disc disease. The most significant changes are spondyloarthritis and degenerative stenosis of the spinal canal.

This means that degenerative changes develop over three periods, with polysaccharides in the nucleus decreasing in the first period. As the geliness of the pulp nucleus decreases, all mechanical weights begin to fall on the fibrous ring, resulting in the development of pathological changes. In the second period of disc degenerative changes, along with collagen fibers, there is also a change in the intermediate matrix. These processes are manifested by dystrophy and necrosis of the substance surrounding the chondrocytes. Small foci of necrosis persist mainly with the death of chondrocytes, leading to the destruction of the pulp nucleus. During this period, the pulp nucleus is extruded and the fibrous ring ruptures. Reactive inflammatory processes in the surrounding tissue exacerbate clinical signs. In the third period, the degenerative changes end with the disintegration of the pulp nucleus and the fibrous ring. The fibrous tissue in the disc grows and multiplies, and the intervertebral space is covered with coarse fibrous connective tissue.

The main clinical criteria for intervertebral disc herniation are: - the appearance of vertebral syndrome, limited mobility, tonic tension of the paravertebral muscles; decreased sensitivity in the area of disc injury; movement disorders in muscles; attenuation or loss of reflexes; biomechanical changes that compensate for the act of movement; The appearance of specific changes in CT and MRI; the appearance of specific changes in electroneurophysiological examinations.

Clinical significance of protrusion and hernia size; 1-2 mm - small protrusion, requiring outpatient treatment; 3-4 mm - medium-sized protrusion - requires ambulatory emergency care; 5-6 mm - medium-sized hernia - can be treated on an outpatient basis; 6-7 mm - medium-sized hernia - outpatient treatment; 9-12 mm - large hernia - requires surgical treatment; Larger than 12 mm - large prolapse or sequestrated hernia - requires only surgical treatment.

Terms proposed by Russian scientists (Magomedov MK, Golovatenko-Abramov KV, 2003); "Protrusion" - protrusion of the intervertebral disc beyond the boundaries of the vertebral body due to the elongation of the fibrous ring; "Extrusion" - the bulge of the disc vibrating nucleus from the rupture of the entire longitudinal ligament, but the fibrous ring; "Chin hernia", in which not only the fibrous ring, but also a rupture of the posterior longitudinal ligament.

Japanese scholars have used the following terms (Matsui Y., Maeda M., Nakagami W. et al., 1998; Takashi I., Takafumi N., Tarou K. et al., 1996): “protrusion” (P-type, P -type) the disc is swollen, but the fibrous ring is not ruptured; - hernia developed with rupture of the fibrous ring and posterior longitudinal ligament; "sequestration" (S-type, S-type) - part of the pulp nucleus

breaks the posterior longitudinal ligament and is sequestrated into the epidural space.

Swedish scientists (Jonsson B., Stromqvist B., 1996; Jonsson B., Johnsson R., Stromqvist B., 1998) distinguish two main types of hernia; resistant (contained) and noncontained. The first group includes protrusion and prolapse; the second group is manifested by extrusion and sequestration. One of the exact schemes was proposed by J. McCulloch and E. Transfeldt (1997); disc protrusion - the initial period of disc herniation, in which all the structural units of the disc bulge out of its boundary, the fibrous ring is pushed into the whole, pulp nucleus fibrous ring; subannular extrusion - the damaged part of the pulp nucleus emerges through the rupture of the fibrous ring, but the outer fibers of the fibrous ring and the posterior longitudinal ligament are whole, but they may have shifted back and forth; transannular extrusion - a fibrous nucleus piercing the fibrous ring and the posterior longitudinal ligament, but its base is connected with the disc; prolapse - sequestration of the hernia and falling into the spinal canal.

Lumbar hernia pain is clinically extensively documented [37; p. 344]. Pain helps to determine the location and morphological features of the hernia in 93% of cases [54; 312-b.]. However, it is difficult to make an accurate topographic diagnosis of some nerve bundle injuries [25; p. 496, 30; p. 408]. Therefore, it would be incorrect to consider compression of the nerve bundle as a single symptom of this disease. There are four main mechanisms involved in the excitation of nerve fibers; dysgemic, dysfunctional, compression, and aseptic-inflammatory. The dysgemic variant is characterized by a microcirculatory disorder in the form of myelo and radiculoischemia, and this is a reflex vascular reaction or direct compression of the tissues. Often these changes are due to a violation of the venous circulation, which is why the veins in this area do not have valves. In this case, the syndrome of constriction of nerve bundles may be due to varicose veins [2; 29-b., 35; Pp. 89-99, 44; 1-b.]. Microcirculatory disorders often develop tumors of the epidural tissue and membranes of nerve structures [13; 50-51-b., 18; Pp. 19-22]. Tissue tumors in turn induce aseptic autoimmune inflammation [19; 145-152-p.]. Secondary changes such as dyscirculation, tumor, and scar growth occur in 18.3% around nerve bundles [30; 408-b.].

Injury of the intervertebral disc occurs in 80 to 85% [16; 156–167], 2.2 to 24% of cases of vertebral pain syndrome are associated with the formation of pathological displacement of the spine [1; 14-18-b., 2; 29-b., 3; 59-67-b., 6; Pp. 20-25, 11; 36-41-b., 12; 6-16-b., 18; 19-22,], evaluates this state of instability as a clinical sign as a deformation of the musculoskeletal system due to external influences, and its three levels differ. If there is no instability, hardening of the intervertebral disc is not clinically evident. At the level of instability, spinal canal

stenosis is maintained in a dynamic state, if restoration of spinal canal size is sufficient, restabilization eliminates clinical signs [49; 122-b., 61; 38-46-b.].

The concept of faceted syndrome has been recorded in the literature, first mentioned by Chormley in 1933, and this symptom occurs as the main symptom of osteochondrosis of the spine in 52% of cases and is sometimes manifested by spondyloarthritis [33; 624-b., 40; 63-67-p.]. A.Yu. Vasilev et al. [12; Pp. 6-16] recorded three levels of osteoarthritis on CT; joint surface syndrome, joint tumor hyperplasia, and morphological decompensation syndrome. In spondyloarthritis, vertebral syndromes occur as vertebral - 11%, radical - 9.8% and muscular - 6.9% [40; 63-67-p.].

Conclusion: The human spine, which is very complex in structure and function, has its own stages of embryonic and postnatal ontogeny, maturation, and involuntary aging. The ossification of the spine continues after birth in the three main centers of the spinal cord. Neurocentral synchondrosis in the area of the legs attached to the vertebral body and a single posterior synchondrosis at the end of the spinal arch provide growth of the spine and dilation of the spinal canal. Spinal osteoporosis is completed when a child is 25 years old.

Intervertebral disc (IVD) [lat. discus intervertebralis] a total of 23, forms part of the vertebral segment and is a flexible-columnar joint between two vertebrae and has a round flat shape. . The spinal disc has a complex structure, surrounded by a pulp nucleus in the center and a fibrous ring around it. The pulp core has ridge plates that cover the upper and lower surfaces. The pulp nucleus consists of well-hybridized randomly located collagen and radially elastic fibers. By the age of 10, there are sparsely located cells resembling chondrocytes at the border of a well-defined pulp nucleus and fibrous ring. The fibrous ring (annulus fibrosus) consists of 20-25 rings or plates, between which are identified collagen fibers located parallel to the plates and at 60o relative to the vertical axis. Elastic fibers, on the other hand, are located radially relative to the rings and serve to maintain the shape of the disc after movement. With age, the boundary of the pulp nucleus with the fibrous ring disappears and becomes fibrosis. As a result, the disc loses its structural elements, the collagen and elastic fibers in the surrounding fibrous ring move to a chaotic location, cracks appear. Degeneration processes also develop in the blood vessels and nerves, and they disappear. Over time, the cells in the disc begin to die. As a result, the number of disc cells in adults is halved. It should be noted that degenerative changes in the structure of the disc, i.e. cell death, fragmented proliferation of cells, fragmentation of the pulp nucleus, changes in the fibrous ring intensify with age, and it is correct to call them pathological processes.

Degenerative changes of the intervertebral disc are manifested in the form of protrusion, extrusion and hernia, and the main reason is a decrease in the amount

of protein glycans in it. This results in aggregate fragmentation, loss of glucosamine lycans, disc dehydration, and decreased osmotic pressure [36]. There are several periods of degenerative-dystrophic changes in the intervertebral disc: period 0 - the disc is unchanged; Stage 1 - 1 in 3 of the inner circle plates of the fibrous ring are ruptured; Stage 2 - the disc is strongly degenerated, but the fibrosis ring is preserved, there is no compression of the nerve bundles, the pain radiates to the knee joint; Stage 3 - cracks appeared along all radii of the fibrous ring, the disc bulged, ruptured the outer transverse ligament.

The study algorithm for the treatment of disc herniation in the CIS countries is not fully developed. In our country there is a lack of literature on incomplete study of disc protrusion, hernia and sequestral hernia. . As the geliness of the pulp nucleus decreases, all mechanical weights begin to fall on the fibrous ring, resulting in the development of pathological changes.

And finally, the study of the specificity of disc protrusion, hernia, and sequestral hernia, the development and clarification of guidelines for diagnosis and treatment are the main content of the monograph.

CHAPTER II.
MATERIALS AND METHODS FOR EVALUATION OF PATHOMORPHOLOGICAL INDICATORS OF PROTURISM AND HERBS OF THE SPINE

§2.1.General information

Based on the specific goals and objectives of the research, a total of 115, including 89 intervertebral disc fragments obtained during surgery at the TTA Neurosurgery Department of patients with protrusions and hernias of the spine, ADTI and Andijan Regional Traumatology Orthopedic Hospitals were obtained as material. As a control group, a spinal disc was isolated from the corpses of those who died from 16 different diseases. In the control group, the lumbar intervertebral disc was isolated from the corpses of those who died mainly from cardiovascular disease. According to the age and number of patients in the control group, 20-29 year olds - 3, 40-49 year olds - 6, 50-59 year olds - 5, 60-69 year olds - 2.

§2.2. Methods of morphological examination

Spinal hernia fragments were hardened for 72 hours in a solution of formalin in 10% phosphate buffer. Paraffin bricks were prepared. In order to identify the connective tissue structures in the connective tissue, mainly fibrous structures, van-Gizon was stained with picrofuxin by histochemical method. The elastic fibers were determined by staining with fuchselin by the Weigert method.

§2.3. Morphometric inspection method

Morphometric examination of the structural units of the intervertebral disc component G.G. Avtandilov's (1984) method of "counting points".
This method is calculated by the author, in fact, by placing a grid of 200 cells on the images of organs and tissues taken from histological preparations, and the points in it correspond to which structures of the tissue. To make the data obtained reliable, points are counted and averaged in 8–10 images from each group of material.

We modified this method by copying it to a computer screen, i.e., taking 10 images from different areas of histological specimens prepared for each group of material being examined, and placing a grid of 200 cells on a computer monitor according to these images. we have listed them accordingly. Since the points of the lattice mesh placed on the tissue cross-section are at the same distance, they correspond to the tissue structures without selection, which means that non-selection is the essence of the method. G.G. Avtandilov's lattice points correspond to the law of relativity, in which all areas of the surface of the tissue picture are uniformly distributed over the structural units. The area of all available structural units in the figure is taken as Vv, i.e. 100%, the area of each of the structural units to be calculated is determined by the name of these structures, e.g. ; Vyai (inflammatory infiltrate), Vno (foci of necrosis), Vk (calcinosis). The results show that each structural unit is a unit of volume in the tissue under study.

Hence, if the area occupied by all structural units in the studied tissue is Vv, ie 100%, then the points distributed in it are denoted by z, and if the relation of each point to the structural unit is R, its formula is as follows;

$$P = Vv / 100$$

The correspondence of the points to the other structural units is determined by the following formula;

$$Q = 100\text{-}Vv / 100$$

Assuming that the points corresponding to the structural units under study are x, its error rate is calculated by this formula; $x / z - P$, the percentage of absolute error is calculated by the following formula;

$$e = (x / z - R). \ 100 = 100\ x / z - Vv$$

According to the theory of relativity, the error rate of the calculation is $x / z - R$, otherwise the formula is calculated as follows;

$$t = \sqrt{Rq} / z$$

In this formula; x is the number of points corresponding to the studied structural units; z is the total number of all points in the test system; R is the unit of relativity of the points falling on the studied structures; q is the unit of relativity of the points falling on the bleeding structural units; t is the normalized difference of the indicators from each other.

Based on the above, the absolute error of the quantitative indicators is calculated in this formula;

$e = t \sqrt{Vv (100 - Vv) / z}$

G.G. Using Avtandilov's morphometric method "counting points - test system", we divided the material of the intervertebral disc protrusion and hernia removed in surgery into the following groups; disc material removed with hernia; sequestered hernia material. In each group; a) fibrous ring b) structural units of the nucleus accumbency were counted separately. In these groups, histological sections prepared from disc material fragments were stained with hematoxylin and eosin dyes and the points corresponding to the structural units shown in the images below were counted.

Fibrous ring and pulp in the nucleus; collagen fibers - CF; chondrocyte cells - CHC; intermediate substance - rum; inflammatory infiltrate - II; calcinosis - C; foci of necrobiosis - FN.

For each structural unit, 10 points listed in the figure were added and the average was calculated, and the area occupied by the structural unit (V) was calculated based on the following formula, e.g. area of collagen fibers in the fibrous ring; CF= FR / R x. In this way, all the structural units and areas of pathological changes of the fibrous ring and pulp nucleus were considered; CF, C, FN, CHC, FR, R'.

The following coefficients can be calculated on the basis of quantitative data obtained on these indicators;

1) The ratio of fibrous ring collagen to the area of the intermediate substance - the coefficient of activity of collagen fibers (CACF);

2) The coefficient of the area occupied by chondrocytes in the fibrous ring and pulp nucleus in relation to the area of collagen fibers - the coefficient of activity of chondrocytes (CFC);

2.2-table

Control rope, fibrosis ring

Number of micro photos, n=10.	Number of points			Total numbers of points
	RCF	RCHC	RI	
1	162	24	14	200
2	166	22	12	
3	166	21	13	
4	160	25	15	
5	164	22	14	
6	162	25	13	
7	164	25	11	
8	163	23	14	
9	163	25	12	
10	164	23	13	
	1634	235	131	2000
M±m %	81,7±1,7%	11,7±1,4%	6,5±1,1%	

V = RCF/ R x 100ε= t √Vv (100 – Vv) / z.
VCF = RCF/C x 100 = 1634/2000 x 100 = 81,7%,CF = 2,0 x √ 81,7(100 – 81,7) / 2000 = 1,7% (R=0,05)
VCF = RCF/R x 100 = 235/2000 x 100 = 11,7%εCF = 2,0 x √ 11,7(100 – 11,7) / 2000 = 1,4% (R=0,05)
VPC = RI/R x 100 = 112/2000 x 100 = 6,5%VI = 2,0 x √ 6,6(100 – 6,6) / 2000 =1,1% (R=0,05)
COCFA = 81,7: 6,5 = 12,6CHAC =11,7 : 81,7 =0,14

2.3-Table

Control rope, pulpous ring

Number of microphotos, n=10v	Number of points			Total number of points
	RCF	RCHC	RI	
1	145	34	21	200
2	146	32	22	
3	146	31	23	
4	145	35	20	
5	144	32	24	
6	142	35	23	
7	144	35	21	
8	146	33	21	
9	143	35	22	
10	144	33	23	
	1445	335	220	2000
M±m %	72,2±2,0%	16,7±1,66%	11,1±0,68%	

VCF= RCF/R x 100 = 1445/2000 x 100 = 72,2%,εcf= 2,0 x √ 72,2(100 – 72,2) / 2000 = 2,0% (P=0,05)
VCF= RCF/R x 100 = 335/2000 x 100 = 16,7%εcf = 2,0 x √ 16,7(100 – 16,7) / 2000 = 1,66% (P=0,05)
VPC = RI/R x 100 = 220/2000 x 100 = 11,1%εI = 2,0 x √ 11,1(100 – 11,1) / 2000 =0,68% (P=0,05)
COCFA =72,2 : 11,1 = 6,5,CHAC = 16,7 : 72,2 = 0,23

2.4-Table

Protrusion, fibrosis rings

Micro Photos Number n=10	Number of points			Total number of points
	RCF	RCHC	RI	
1	137	27	36	200
2	136	26	38	
3	133	24	43	
4	134	27	39	
5	131	28	41	
6	132	25	43	
7	133	26	41	
8	133	28	39	
9	133	25	42	
10	134	23	43	
	1336	259	405	2000
M±m %	66,8±2,1%	12,9±1,49%	20,3±1,8%	

VCF = RCF/R x 100 = 1336/2000 x 100 = 66,8%,εcf = 2,0 x √ 66,8(100 – 66,8) / 2000 = 2,1% (R=0,05)
VCF = RCF/R x 100 = 259/2000 x 100 = 12,9%εcf = 2,0 x √ 12,9(100 – 12,9) / 2000 = 1,49% (R=0,05)
VPC = RI/R x 100 = 405/2000 x 100 = 20,3%εi = 2,0 x √ 20,3(100 – 20,3) / 2000 =1,8% (R=0,05)
COCFA = 66,8: 20,3 = 3,2 (norm – 12,6)CHAC =12,9 : 66,8 = 0,19 (norm – 0,14)

2.5-Table

Protrusion, pulpous ring

Number of micro photos, n=10	Number of points			Total number of points
	RCF	RCHC	RF	
1	113	36	51	200
2	108	37	55	
3	112	35	53	
4	103	37	60	
5	110	36	54	
6	109	38	53	
7	100	39	61	
8	113	36	51	
9	113	35	52	
10	110	37	53	
	1091	366	543	2000
M±m %	54,5±2,22%	18,3±1,73%	27,2±1,98%	

VCF = RCF/R x 100 = 1091/2000 x 100 = 54,5%,εcf = 2,0 x √ 54,5(100 – 54,5) / 2000 = 2,22% (R=0,05)
V = RI/R x 100 = 366/2000 x 100 = 18,3%εcf = 2,0 x √ 18,3(100 – 18,3) / 2000 = 1,73% (R=0,05)
VI = RI/R x 100 = 543/2000 x 100 = 27,2%εi = 2,0 x √ 27,2(100 – 27,2) / 2000 =1,98% (R=0,05)
COCFA =54,5 : 27,2 = 2,0 (norm– 6,5)CHAC = 18,3 : 54,5 = 0,34 (norm – 0,23)

2.6-Table

Hernia, fibrous ring

Number of micro photos	Number of points						Total number of points
	R	RCH	RI	II	FON	C	
1	63	33	58	19	16	11	200
2	64	31	57	19	17	12	
3	61	32	61	18	15	13	
4	66	30	57	18	19	10	
5	64	28	59	17	18	14	
6	58	31	57	21	21	12	
7	64	31	56	18	18	13	
8	65	30	58	19	17	11	
9	64	30	56	19	19	12	
10	61	30	57	20	18	14	
	630	306	576	188	178	122	2000
M±m %	31,5±2,67%	15,3±1,6 %	28,8±2,02%	9,4±1,3 %	8,9±1,27 %	6,1±1,07 %	

VCF = RCS/R x 100 = 852/2000 x 100 = 42,6%,εcf= 2,0 x √ 42,6(100 – 42,6) / 2000 = 2,21% (r=0,05)
VCH = RCH/R x 100 = 288/2000 x 100 = 14,4%εcf = 2,0 x √ 14,4(100 – 14,4) / 2000 = 1,57% (r=0,01)
VI = RI/R x 100 = 476/2000 x 100 = 23,8%εi = 2,0 x √ 23,8(100 – 23,8) / 2000 =1,9% (I=0,01)
VII = RII/R x 100 = 205/2000 x 100 = 10,3%,εii = 2,0 x √ 10,3(100 – 10,3) / 2000 = 1,35% (r=0,01)
VFON = RFON/R x 100 = 121/2000 x 100 = 6,1%εfon= 2,0 x √ 6,1(100 – 6,1) / 2000 = 1,07% (R=0,05)
VC = RC/R x 100 = 58/2000 x 100 = 2,9%εc = 2,0 x √ 2,9(100 – 2,9) / 2000 =0,75% (C=0,01)
COCFA = 42,6: 23,8 = 1,79 (norm-12,6)CHAC =14,4 : 42,6 = 0,34 (norm -0,14)

2.7-table

Sequestrated hernia, fibrous ring

Number of micro photos, n=10	Number of points						Total number of points
	RCF	RCHC	RI	II	FON	C	
1	63	33	58	19	16	11	200
2	64	31	57	19	15	12	
3	61	32	61	18	19	13	
4	66	30	57	18	19	10	
5	64	28	59	17	18	14	
6	58	31	57	21	21	12	
7	64	31	56	18	18	13	
8	65	30	58	19	17	11	
9	64	30	56	19	19	12	
10	61	30	57	20	18	14	
	679	280	276	414	221	122	2000
M±m %	31,5±2,67%	15,3±1,6 %	28,8±2,02%	9,4±1,3 %	8,9±1,27 %	6,1±1,07 %	

VCF = RCF/R x 100 = 630/2000 x 100 = 31,5%,εCf = 2,0 x √ 31,5(100 – 31,5) / 2000 = 2,67% (R=0,05)
VCHC = RCHC/R x 100 = 306/2000 x 100 = 15,3%εxx = 2,0 x √ 15,3(100 – 15,3) / 2000 = 1,6% (R=0,01)
VI =RI/R x 100 = 276/2000 x 100 = 576/2000 x 100 = 28,8%εoI = 2,0 x √ 28,8(100 – 28,8) / 2000 =2,02% (R=0,01)
VII = RII/R x 100 = 188/2000 x 100 = 9,4%,εII = 2,0 x √ 9,4(100 – 9,4) / 2000 = 1,3% (R=0,01)
VFON = RFON/R x 100 = 178/2000 x 100 = 8,9%εfon= 2,0 x √ 8,9(100 – 8,9) / 2000 = 1,27% (R=0,05)
VC = RC/R x 100 = 130/2000 x 100 = 122/2000 x 100 = 6,1%εc = 2,0 x √ 6,1(100 – 6,1) / 2000 =1,07% (R=0,01)
COCFA =31,5 : 28,8 =1,09 (norm -6,5)CHAC = 15,3 : 31,5 = 0,48 (norm - 0,23)

2.8-Table

Sequestrated hernia, fibrous ring

Number of microphotos, n=10	Number of points						Total number of points
	RCF	RCHC	RI	II	FON	C	
1	63	33	58	19	22	12	200
2	65	31	27	39	23	15	
3	64	28	31	43	21	13	
4	74	26	27	38	24	11	
5	68	24	29	42	23	14	
6	72	27	27	41	21	12	
7	64	29	26	43	23	15	
8	70	29	28	41	21	11	
9	67	28	26	44	22	13	
10	69	27	27	42	21	14	
	679	280	276	414	221	130	2000
M±m %	33,9±2,11%	14,0±1,55%	13,8±1,54%	20,7±1,81%	11,1±1,4%	6,5±1,1%	

VCF = RCF/R x 100 = 679/2000 x 100 = 33,9%,εcf = 2,0 x √ 33,9(100 – 33,9) / 2000 = 2,11% (R=0,05)
VCHC = RCHC/R x 100 = 280/2000 x 100 = 14,0%εchc = 2,0 x √ 14,0(100 – 14,0) / 2000 = 1,55% (R=0,01)
VI =RI/R x 100 = 276/2000 x 100 = 13,8%εi = 2,0 x √ 13,8(100 – 13,8) / 2000 =1,54% (R=0,01)
VII = RII/R x 100 = 414/2000 x 100 = 20,7%,εii = 2,0 x √ 20,7(100 – 20,7) / 2000 = 1,81% (R=0,01)
VFON = RFON/R x 100 = 221/2000 x 100 = 11,1%εfon = 2,0 x √ 11,1(100 – 11,1) / 2000 = 1,4% (R=0,05)
VC = RC/R x 100 = 130/2000 x 100 = 6,5%εc = 2,0 x √ 6,5(100 – 6,5) / 2000 =1,1% (R=0,01)
COCFA = 33,9: 13,8 = 2,45 (norm-12,6)CHAC =14,0 : 33,9 = 0,41 (norm -0,14)

2,9-Table

Sequestrated hernia, pulpous ring

Number of micro photos, n=10	Нуқталар сони						Total number of points
	RCF	RCHC	RI	II	FON	C	
1	32	43	38	17	56	14	200
2	33	41	37	17	57	15	
3	41	42	31	18	55	13	
4	31	42	37	18	59	13	
5	24	48	39	17	58	14	
6	29	41	37	17	61	15	
7	34	41	36	18	58	13	
8	22	50	38	19	57	14	
9	23	47	36	19	59	16	
10	33	46	31	18	58	14	
	302	441	360	178	578	141	2000
M±m %	15,1±1,61%	22,1±1,85%	18,0±1,71%	8,9±1,27 %	28,9±2,02%	7,1±1,14%	

VCF = RCF/R x 100 = 302/2000 x 100 = 15,1%,εcf = 2,0 x √ 15,1(100 – 15,1) / 2000 = 1,61% (R=0,05)
VCHC = RCHC/R x 100 = 441/2000 x 100 = 22,1%εchc = 2,0 x √ 22,1(100 – 22,1) / 2000 = 1,85% (R=0,01)
VI = RI/R x 100 = 360/2000 x 100 = 18,0%εi = 2,0 x √ 18,0(100 – 18,0) / 2000 =1,71% (R=0,01)
VII = RII/R x 100 = 414/2000 x 100 = 20,7%,εii = 2,0 x √ 20,7(100 – 20,7) / 2000 = 1,81% (R=0,01)
VFON = RFON/R x 100 = 221/2000 x 100 = 11,1%εfon = 2,0 x √ 11,1(100 – 11,1) / 2000 = 1,4% (R=0,05)
VC = RC/R x 100 = 130/2000 x 100 = 6,5%εc = 2,0 x √ 6,5(100 – 6,5) / 2000 =1,1% (R=0,01)
COCFA = 33,9: 13,8 = 2,45 (norm-12,6)CHAC =14,0 : 33,9 = 0,41 (norm -0,14)

Conclusion. We calculated the protrusion and hernia material removed in the surgical operation of the intervertebral disc by dividing it into the following groups; intervertebral disc from the corpse of those who died of other diseases, as a control group; disc material removed with hernia; sequestered hernia material. In each group, the fibrous ring, the structural units of the pulp nucleus difference were counted separately. This information is very important and is a study that has a place in the choice of diagnostic and treatment algorithm in practice.

III - CHAPTER
ANALYSIS OF CLINICAL-ANAMNESTIC AND LABORATORY DATA OF SPINAL HERBS

§3.1. Clinical morphological analysis of the material

A total of 115 people, including 89 postoperative patients and 16 people who died of other diseases as a control group, were isolated from the carcass as a case study for the analysis of the clinical diagnosis of spinal hernia. In the control group, a lumbar intervertebral disc was isolated from a human corpse who had died primarily of cardiovascular disease. At the same time, 20-29 year olds - 3, 40-49 year olds - 6, 50-59 year olds - 5, 60-69 year olds - 2.

89 cases included in the main group were used in biopsy examination of fragments of the intervertebral disc removed during surgical treatment of lumbar hernia in the last 5 years (2015-2019) in the biopsy diagnostic department of the SSP RPAM of the Republic of Uzbekistan. Analysis of clinical and laboratory data of patients was obtained from referrals to pathohistology and medical history of patients treated in the department of neurosurgery, traumatology.

For the analysis of anamnestic data, the age, sex, and comorbidities of 64 men and 51 women were distributed as follows; a total of 64 men were observed, of whom 15–19 and 20–29 years of age were less common, and 30–39 to 50–59 years of age were more common. While the number of female patients was less than that of men, i.e., 51, they were also found to have a higher incidence of the disease at the same age as males (see Table 3.1).

An analysis of the duration of spinal hernia on the basis of medical history revealed that the average duration in men was 7.8 years. In relatively young patients under 39 years of age, the duration of the disease was not very long, i.e., it ranged from 3 to 4 years. In older patients, the duration of the disease was confirmed to be 7.8 years in 40-49 year olds and up to 14.4 years in 70-79 year olds (see Table 3.2).

3.1-Table

The incidence rate of hernia in male and female patients by age

	Age groups							
	15-19	20-29	30-39	40-49	50-59	60-69	70-79	overall
Male	4	8	12	11	14	9	6	64
Female	2	6	10	9	12	7	5	51

3.2-Table

Indicator of disease duration by age of male patients, years

	Age groups							
	15-19	20-29	30-39	40-49	50-59	60-69	70-79	overall
Male	4	8	12	11	14	9	6	64
Duration of illness, years	3,2	3,7	4,2	7,8	9,1	12,3	14,4	7,8

When disease data were analyzed in female patients, the duration of the disease varied slightly with age. That is, in patients aged 15 to 49 years, the duration was 3–6 years, while in older adults it was 8–13 years, which was slightly lower than in men. (See Table 3.3).

3.3-Table

	Age groups							
	15-19	20-29	30-39	40-49	50-59	60-69	70-79	overall
Female	2	6	10	9	12	7	5	51
Duration of illness, years	2,8	3,1	3,7	6,5	8,6	11,4	12,7	6,9

It is known that there are 3 main forms of spinal disc disease, namely protrusion, hernia and sequestrated hernia. In our anamnestic analysis, out of a total of 64 cases in men, 17 cases, ie 26.6%, were protrusions, 35 cases, ie 54.7% were hernias, and 10 cases, ie 15.6% were sequestered hernias. The protrusion form was most common in young people, i.e., patients aged 15 to 39 years, and less common in adults and the elderly. Hernia, in contrast, has been found to be more common in middle-aged and elderly people. The highest sequestration was detected during the period of peak human activity, i.e., 7 cases in 30-39 year olds, 8 cases in 40-49 year olds, and 8 cases in 50-59 year olds. Sequestration of the hernia was also more common in middle-aged people (see Table 3.4)

3.4-Table

The incidence of hernia in men (abs)

	Age groups							
	15-19	20-29	30-39	40-49	50-59	60-69	70-79	Overall
Male	4	8	12	11	14	9	6	64
Protrusion	3	4	3	2	3	2	0	17 (26,6%)
Hernia	1	3	7	8	8	5	5	35 (54,7%)
Sequestration	0	1	2	1	3	2	1	10 (15,6%)

When the incidence rate of hernia forms in female patients was considered, it was observed that the rates were closer to those in men. Only the hernia form was found to be more common in women, accounting for 58.9%. Protrusion and sequestrated hernia rates appeared to be close to those of men. Both simple hernias and sequestrated hernias were more common in middle-aged women (see Table 3.5).

3.5-Table

Indicators of the incidence rate of hernia forms in female patients by age, in numbers

	Age groups							
	15-19	20-29	30-39	40-49	50-59	60-69	70-79	Overall
Female	2	6	10	9	12	7	5	51
Protrusion	2	3	3	2	3	1	0	14 (27,4%)
Hernia	0	3	6	5	8	4	4	30 (58,9%)
Sequestration	0	0	1	2	1	2	1	7 (13,7%)

From the data presented in the medical history, the incidence of other diseases present in the anamnesis of the patients was analyzed. At the same time, it was found that obesity ranked first as a life-threatening disease of spinal hernia, accounting for 25%. The next places were taken by kidney disease, ischemic heart disease and hypertension. These data showed that young patients, i.e., patients aged 15 to 39 years, were diagnosed with general obesity, some of which had kidney disease, which led to a sharp increase in body weight. Obesity, kidney, liver, and lung disease appear to predominate in middle-aged patients. With age, it is natural to have a high incidence of UIC and hypertension (see Table 3.6).

Among women, obesity was also higher than in men, at 35.3%. In the next places, kidney, liver disease and diabetes showed high rates. In women aged 15 to 39 years, overall obesity was even higher than in men. In addition to obesity in middle-aged and elderly people, the incidence of UIC and hypertension was found to be high (see Table 3.6). Hence, it has been proven that spinal hernia is also more common in women when they gain weight.

3,6-Table

The incidence rate, number, and percentage of co-morbidities in male patients by age

	Age groups							
	15-19	20-29	30-39	40-49	50-59	60-69	70-79	Overall
Male	4	8	12	11	14	9	6	64
IHD				1	4	3	2	10 (15,6%)
Hypertension				2	3	2	1	8 (12,5%)
Illnesses	1	1	3	2	2	1		10 (15,6%)
Lungs Disease			2	1		1	2	6 (9,4%)
Liver disease		2	2			1		5 (7,8%)
Diabetes mellitus			1	3	3			7 (10,9%)
Obesity	3	3	4	2	2	1	1	16 (25%)
Autoimmune		1						1 (1,6%)
And other diseases		1						1 (1,6%)

As a result of the analysis of anamnestic and laboratory data in the history of the disease, the indications for conducting microdiscectomy surgery in patients were analyzed. The guidelines for surgical removal of a spinal hernia are as follows, and their detection rate is calculated as a percentage; severe and unbearable pain under the influence of drugs 94.7%, enlargement of the areas of anemia and paresthesia - 56.8%, enlargement of the central paralytic area in the legs and arms - 67.4%, the appearance of local inflammatory symptoms - the development of perifocal epiduritis, sequestration into the spinal canal decrease was detected in 72.8%. Sudden occurrence of 3 clinical signs - 62.6%; the second clinical sign was observed in 85.4%. From these indicators, it can be concluded that the presence of symptoms 1, 2 and 3, based on the surgical treatment of spinal hernia, is an absolute indicator, in particular, their combination further increases the level of indications (see Table 3.7).

3.7-Table

The incidence rate, number, and percentage of other related diseases in female patients by age

	Age groups							
	15-19	20-29	30-39	40-49	50-59	60-69	70-79	overall
Female	2	6	10	9	12	7	5	51
IHD				2	2	1		5 (9,8%)
Hypertension				2	3	2	1	8 (15,7%)
Kidney disease	1	2	2	1	2		1	9 (17,4%)
Lung disease								0
Liver disease			1					1 (1,9%)
Diabetes Mellitus			1		2	2	1	6 (11,7%)
Obesity	1	3	3	4	3	2	2	18 (35,3%)
Autoimmune		1	2					3 (5,9%)
And other diseases			1					1 (1,9%)

According to the survey of the history of the disease, equipment tests and analysis of clinical diagnoses based on laboratory analysis, the incidence of species by size of the hernia, in which segments of the lumbar spine are more common, depending on which side of the hernia bulges and the specificity of some forms was calculated.

The calculation of the types of hernias in terms of levels and sizes found in our material showed the following; 1-3 mm bulge of disc tissue in the form of

prolapse - 13.5%; 3–6 mm prolapse - 20.8%, 5–15 mm protrusion - 19.6%, 6–15 mm hernia - 33.8% and sequestrated hernia - 12.3%.

The following types of disc swelling and their degree of encounter were determined by which side the disc was embossed; anterior-lateral type - 23.4%, posterior-lateral type - 68.5% and circular form - 8.1%. Hence, in our material, it is observed that the back-side type is more common than spinal hernias.

Of these types of hernias, the posterior-lateral form is the most dangerous, and according to our material, it is this form that is most confirmed to have been surgically removed. It is determined that the following manifestations of this type of hernia have been encountered, and we demonstrate this using Figure 3.1 and thank the author of this figure. These forms are: medial hernia, paramedial hernia, foraminal hernia, lateral, paramedial, diffuse.

§3.2. Analysis of magnetic resonance imaging

With the development of modern medicine, treatment and analytical practices are becoming more common. The examination should be based on the frontal, sagittal and axial sections. On MRI, the image appears on the monitor depending on the strength of the magnetic field and the series of received pulses, the density of protons in the tissue, and the relaxation time.

(T1 in order of T2). At present, there are many clinics that offer modern MRT devices of modern world standards. Therefore, we do not need to pay attention to the types of MRIs.

In the study, we focused mainly on changes in the lumbar disc herniation, as statistics show that the most affected area is the lower back. This area is the result of inactivity of the elderly. We tried to study the lumbar spine in the sagittal 60, frontal 70 and horizontal sections in the order T1 and T2 with a black-and-white tomogram. The hollow and cortical layers of the spine are fully visible due to the speed of received impulses. The outer hyaline layer around the spine is oval in T1 order. the posterior aspect did not deviate from the vertebral body (see Table 3.9). Table 20 shows that disc herniations formed in accordance with pathomorphological changes during the developmental phase of pain syndrome in the elderly are located in the sagittal plane of 60 segments of the lumbar spine in our observation.

3.8-Table

The degree of placement of disc hernias in the frontal lobe

Hernia area	VL_1-VL_2	VL_2-VL_3	VL_3-VL_4	VL_4-VL_5	VL_5-VS_1	Amount	%
Medial		1	2	3	2	8	11.5%
Paramedial	1	1	3	4	4	13	18.5%
Lateral	1	4	6	12	10	33	47%
Foramenal	-	1	-	8	7	16	23%
Overal	2	7	11	27	23	70	100%

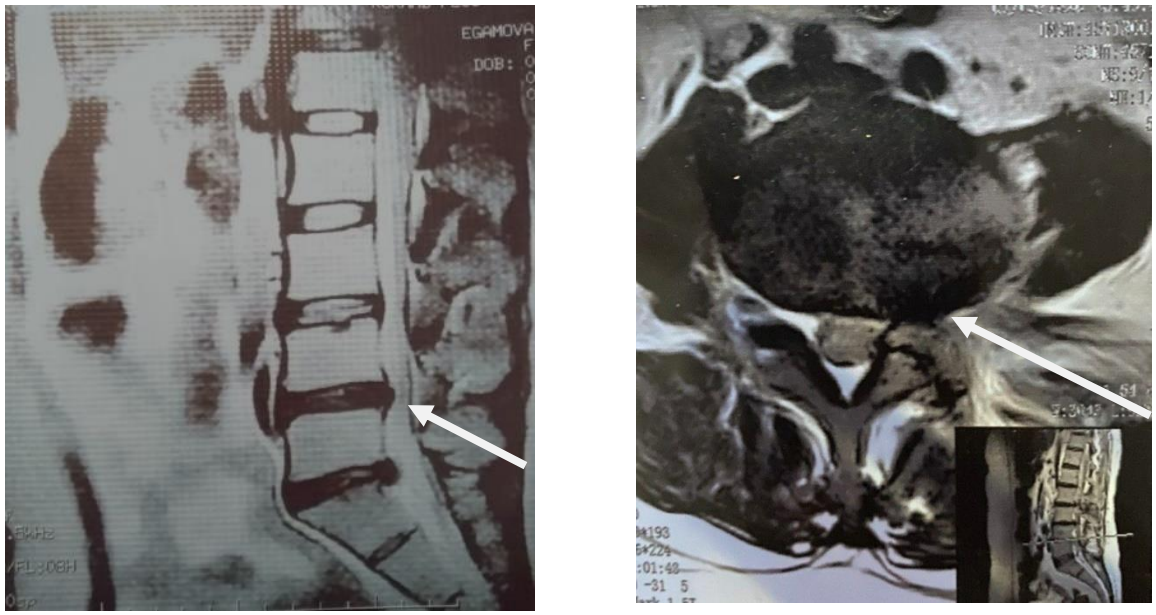
3.9-Table

Location of disc hernias in the sagittal plane

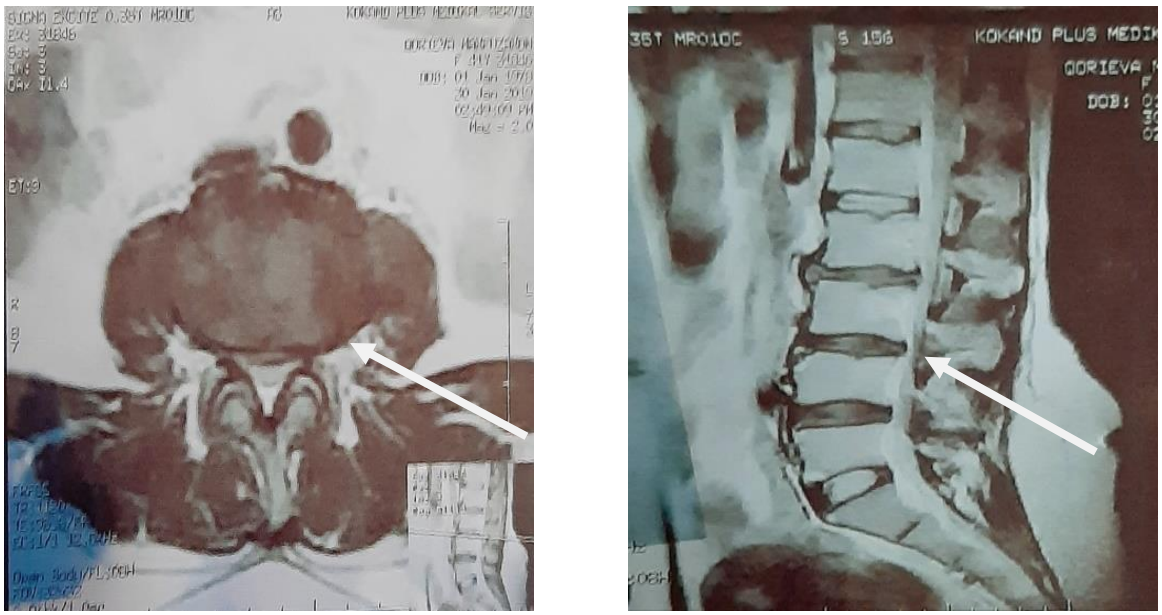
Hernia area	VL_1-VL_2	VL_2-VL_3	VL_3-VL_4	VL_4-VL_5	VL_5-VS1	Amount	%
Over the link	1	-	2	5	4	12	20%
Under the link	3	1	8	7	6	25	42%
Sequestrated hernia	-	2	3	10	8	23	38%
Overall	4	3	1 3	22	18	60	100%

In the T1 mode, the MRI signal velocity is not high (50–60 m / s). In the T2 order, two parts of the speed of the intervertebral disc signals are different (120-140 m / s) (see Fig. 2). longitudinally, consisting of a set of limiting rings and a fibrous ring.

The presence of low-velocity cavities in the central part of the T2-order fibrous ring, which appear to be located at a distance close to the fibrous ring tissue of the fibrous ring tissue. The results of MRI in lumbar disc herniation correspond to the stage of development of the hernia.



2-Picture. In the T1 procedure, the normal vibrational ring on MRI is 50-60 m/s



3-Picture. L2-L5 disc herniation of the central part of the T2-order fibrous ring, pulse rate is 120-140 m/s (the central part of the fibrous ring is marked)

Hypohydration of the intervertebral disc - this condition is characterized by degenerative-dystrophic changes in the intervertebral disc, the vertical volume of the intervertebral disc is slightly reduced. However, fibrosis is not visible in the cross section of the central part of the ring.

Intervertebral disc dehydration. In this case, pathomorphological features; disc shape change, disc height reduction, vibrational ring border, and MRI signal weakness are uncertainties.

Conclusion

In general, as a result of clinical anamnesis, instrumental examination and analysis of clinical diagnoses based on laboratory data, it became clear that our analytical data determine the algorithm for individual diagnosis and treatment of patients. and we determined the extent of their occurrence.While the MRI screening method is not only applicable to the elderly, we have analyzed its relevance in determining pathomorphological signs.

IV - CHAPTER. ANALYSIS AND CONTROL OF NORMAL HISTOLOGICAL STRUCTURE AND PATHOMORPHOLOGICAL CHANGES OF DEGENERATIVE PROCESSES OF SPINAL DISK

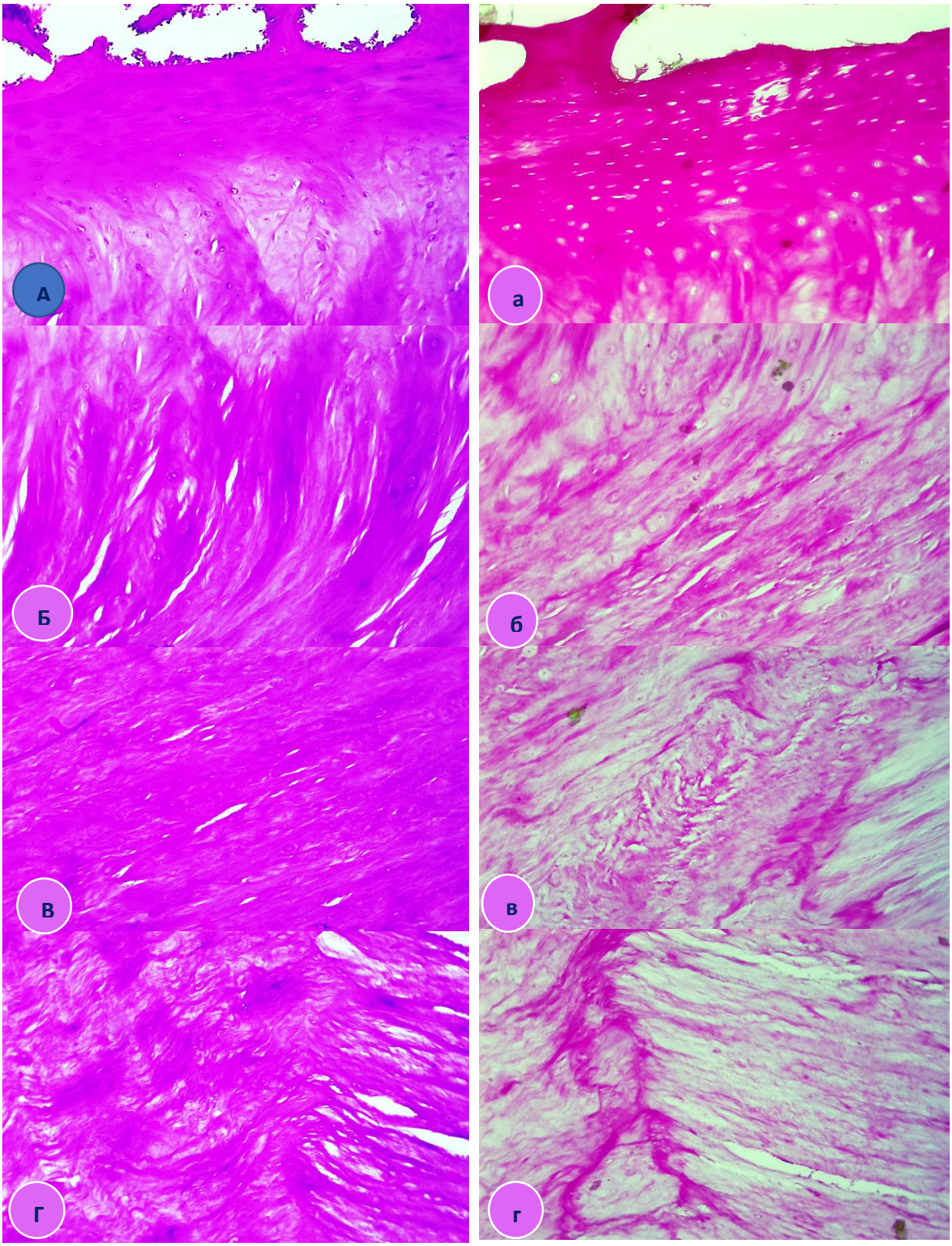
§4.1. Microscopic structure of the human vertebral disc.

Synchondrosis of the spine, i.e. the intervertebral symphysis, the study of the histological structure of the intervertebral disc showed that the disc contains a surrounding fibrous ring and a resilient nucleus. The vertebrae in this area are composed of hollow bone, in which the bone marrow is in the form of islets of various sizes, containing all the primary and intermediate cells of hematopoiesis (see Figure 4A). Most monocytic, histiocytic, osteoblast and chondroblast cells are concentrated in the islets of bone marrow attached to the symphysis of the uncle's ring.

The inner, anterior longitudinal ligament lateral surface of the intervertebral disc is surrounded by a fibrous membrane composed of much thicker and denser collagen fibers. In this case, the collagen fibers of the connective tissue form a dense fibrous tissue consisting of dense and large tufts. The inner part of the fibrous tissue consists of dense collagen fibers, and the outer part is relatively sparse, there is a tumor and an intermediate substance between the tufts of collagen fibers. The vertebral column of the tibial disc and the lateral surface of the posterior longitudinal ligament are covered with a layer of fibrosis about twice as thin. The peculiarity of this is that the connective tissue is relatively thin and sparse, located in a bunch of collagen fibers, in some places there are tubes through which blood vessels pass.

The upper and lower surfaces of the intervertebral disc are composed of dense connective tissue adjacent to the vertebrae. The fibrous tufts of connective tissue are arranged in parallel along the circumference, among which are small chondrocytes of size relative to other areas (see Fig. 4B). In some places there are small foci of calcification. When the histochemical method is stained with van Gizon, large amounts of collagen fibers are observed in this densely packed layer (see Figure 4a). The location of the interstitial chondrocytes is manifested in the form of colorless vacuoles.

The inner side of this dense uncle tissue peripheral layer, i.e., the side facing the nucleus of the disc, is different from the outer layer. In this case, the tufts of connective tissue are located in the direction from the outer layer to the inner layer, and chondrocytes are identified one by one between these tufts (see Figure 4.1V). Between the tufts consists of an intermediate substance that is slightly crushed and swollen. When dyed by Van-Gizon histochemical method, the collagen fibers in the tufted tufts of this layer are arranged separately to form relatively thin tufts (see Figure 4b). Among them, the uncle cells are leaking and appear unpainted. In the next layer of this layer, the connective tissue is still sparse and irregular, consisting of transverse tufts unlike the previous layer (see Fig. 4c). In the connective tissue in this layer, collagen fibers are arranged in separate bundles, among which are relatively sparse and low in collagen fibers, consisting of interstitial connective tissue. Especially in the histochemical van-Gizon dye, irregularly arranged tufts of collagen fibers are dyed a darker red color.


А
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4-Picture. Histological structure of the intervertebral disc. The A-fibrous ring is bordered by the vertebral column, the periphery of the B-disc ridge, the inner part of the V-disc ridge, the G-revolving nucleus.

A-fibrous ring, b-peripheral part of b-disc ridge, inner part of v-disc ridge, g-revolving nucleus. Van Gizon paint

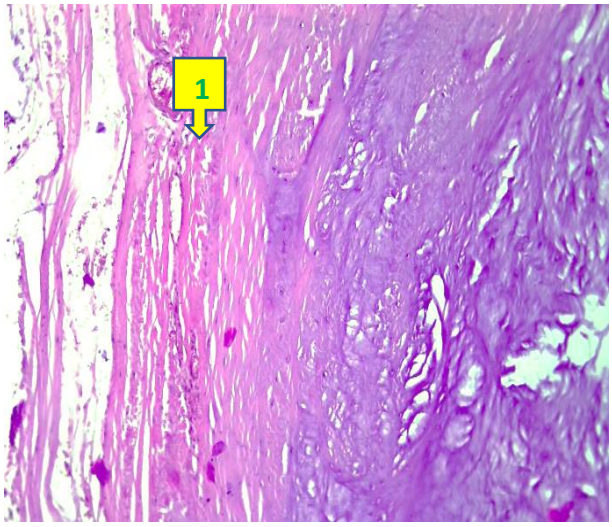
In the center of the intervertebral disc is a living nucleus. This nucleus is histologically relatively sparsely fibrous, with many chondroid material. In this case, the tufts of connective tissue are disordered, dense in some places, sparse in other areas, there are almost no connective cells between the fibers (see Figure 4G). Histochemical examination, ie van-Gizon staining, revealed that, like seawater waves, sometimes light-colored low-fiber, intermediate chondroid material with a lot of thin connective tissue, and in other places, such as where the water wave rises, there are tufts of dark red collagen fibers. occupied.

The study and analysis of specific aspects of the histological structure of the spinal disc revealed that there were specific changes in terms of the fibrosis ring, the structure of the connective tissue, and the relationship to the spinal cord. The inner surface of the anterior longitudinal ligament side of the tibial disc is relatively thick with a fibrous ring, especially since its inner half-layer is composed of dense collagen fibrous tufts. In the outer half of the tissue is relatively sparse and fragile, the tufts of collagen fibers are also relatively thin, with swelling and interstitial material

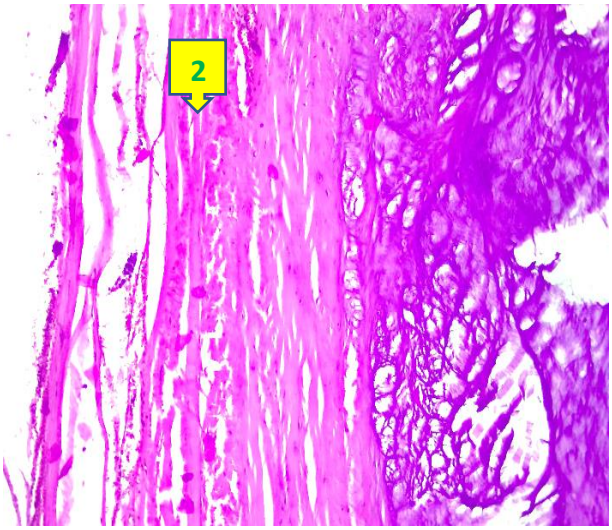
(See Figure 5). In some places the blood vessels passed.

On the side of the spinal disc facing the spinal cord and the posterior longitudinal ligament, the fibrous ring tissue is relatively thin, its inner connective layer is also sparse and fragmented, and the collagen fibrous tufts are relatively thin and fragmented. The outer half-layer is also sparse, with tufts of collagen fibers arranged parallel to each other, between which is a tumor and an intermediate substance (see Fig. 6). On the outer surface there is a separate thin connective tissue membrane, under which there is a sparsely swollen substance.

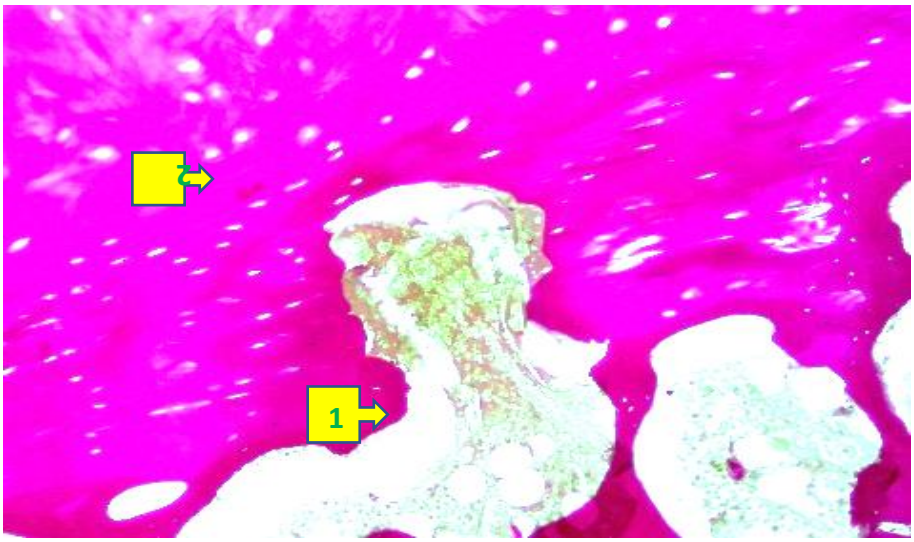
Specific changes are detected in the outer surface of the spinal disc, ie in the areas adjacent to the spine. It is found that the bone marrow of the spine has islets that are deeply embedded in the connective tissue (see Figure 7).



5-Picture. The inner surface of the disc is a fibrous ring. (1).Paint: G-E. X: 400



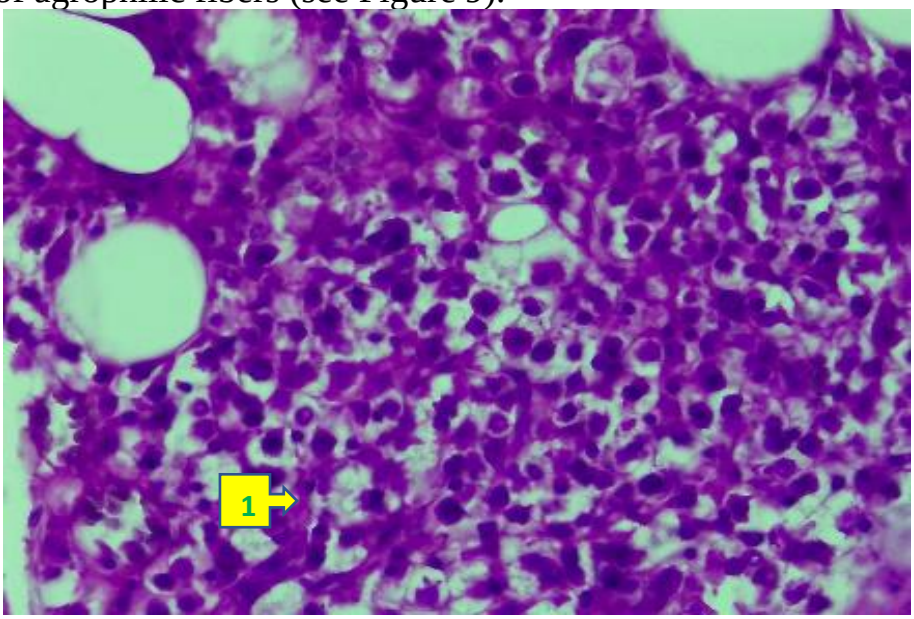
6-Picture. Fibrous ring of the disc-shaped surface of the disc (1).Paint: G-E. X: 400



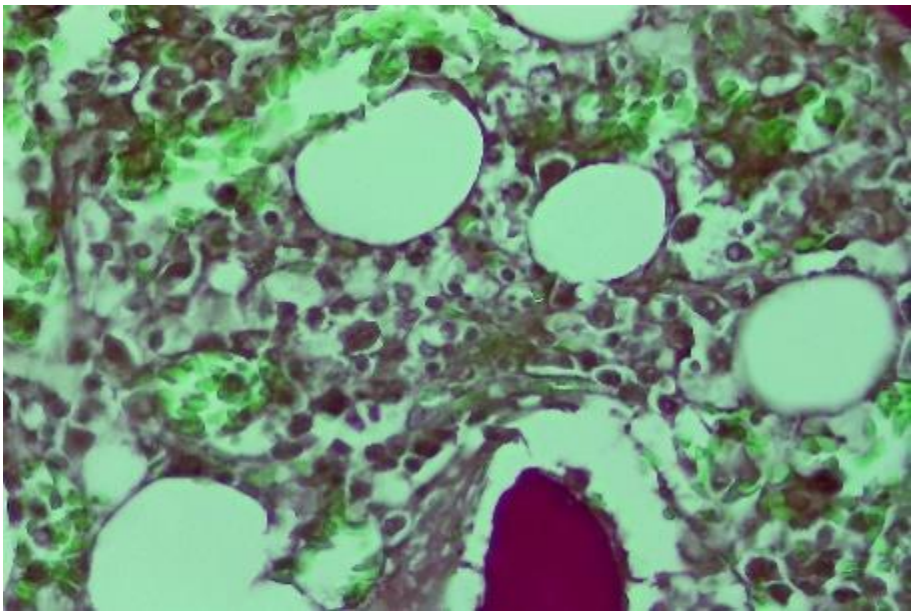
7-Picture. The area of the bone marrow (1) that sinks into the ridge (2)

Paint:one-Gizon. X: 400

The bone marrow in these areas contains an infiltrate consisting of monocytic and histiocytic cells (see Figure 8). The infiltrate is composed mainly of monocytes, polyblasts, chondroblasts and osteoblasts. Among these cells is a thin fibrous intermediate, and in some areas fat cells are also found. When stained by the histochemical method in Van Gizon, it is determined that the infiltrate of these cells does not contain collagen fibers, the sparse fibers in the intermediate are composed of agrophilic fibers (see Figure 9).



8-Picture. Bone marrow at the border of the uncle (1).Paint: G-E. X: 400.



9-Picture.Bone marrow.Paint: one-Gizone. X: 400

The relative thinness of both the bone and the uncle is determined on the surface where the bone and dense connective tissue on the side of the upper joint surface of the spine are connected. In this area, the bone hard tissue is located in the form of a thin plate, while the connective tissue has a structure in the form of bumps, forming separate fragments, depending on the inside of the disc. Between and around them there is a tumor and an intermediate chondroid substance, and in the ridge there are bundles of chondrocytes in the form of islands.

Similarly, in the interlocking areas of bone and connective tissue, the presence of fibrous chondroid substance in the form of separate islets of different sizes is detected. Relatively large chondrocytes are located in the connective tissue around these islands. Some of the islets are absorbed, shrink, and shrink into cavities filled with calcined matter.

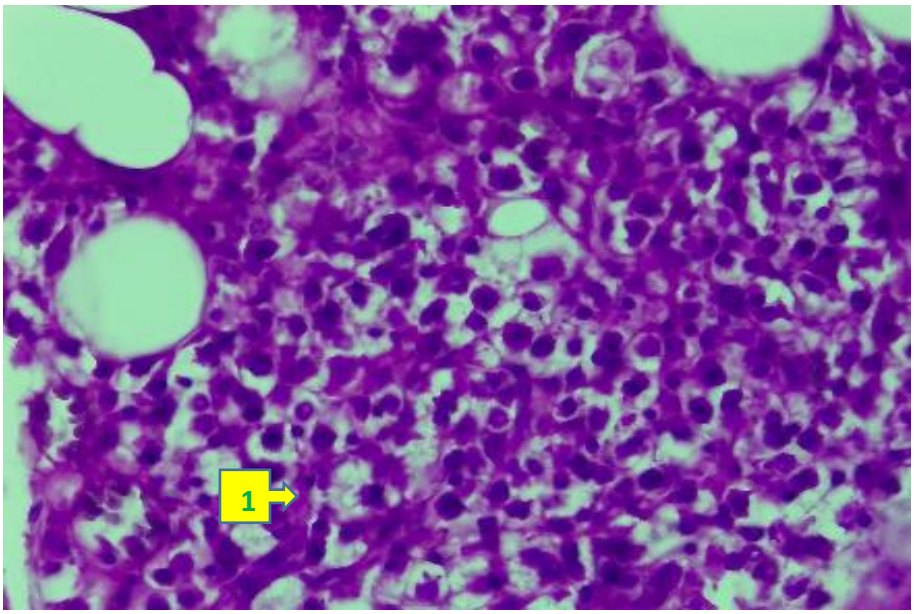
Conclusion. Spinal synchondrosis consists of a symphysis between the vertebrae and a fibrous ring of fibrous ring and fibrous nucleus. in the dense dense layer of the edge of the disc, the fibrous tufts are arranged in a circle, in a radial direction in the inner layer, in a disordered direction in a layer close to the vibrating nucleus.

Specific changes were found in the outer surface of the vertebral disc, i.e., in the areas adjacent to the vertebrae, i.e., the presence of islets in which the bone marrow was deeply embedded in the connective tissue. These bone marrow islets were found to contain an infiltrate composed of monocytic and histiocytic cells. The infiltrate is composed mainly of monocytes, polyblasts, chondroblasts and osteoblasts. On the surface where the bone and dense connective tissue are connected to each other, it is determined that they have thinned areas and that there is a fibrous chondroid substance in the form of islands of different sizes. Relatively large chondrocytes are located in the connective tissue around these islands. Some of the islets are absorbed, shrink, and shrink into cavities filled with calcined matter.

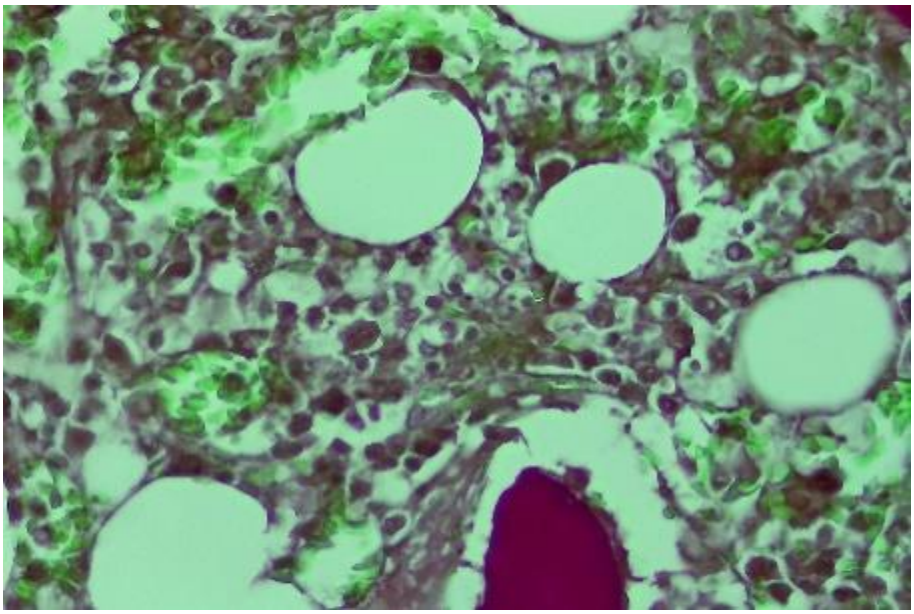
§4.2. Pathomorphological changes that develop as a result of protrusion of the vertebral disc

In the initial period of dystrophic and degenerative changes in the structure of the intervertebral disc, pathological processes were observed to develop simultaneously in all morphofunctional parts of the disc. But the degree of development of pathological processes varies. Initially, when we consider the changes in the tissue of the outer fibrous ring, in this layer, mainly swelling of the intermediate substance and rupture of the tumor of the collagen fibers were observed. It was found that the tumor process developed strongly in the outer

layers of the fibrous ring, resulting in the separation of collagen fibers and the formation of a gap between them (see Figure 10).



8-Picture. Bone marrow at the border of the ridge (1).Paint: G-E. X: 400.



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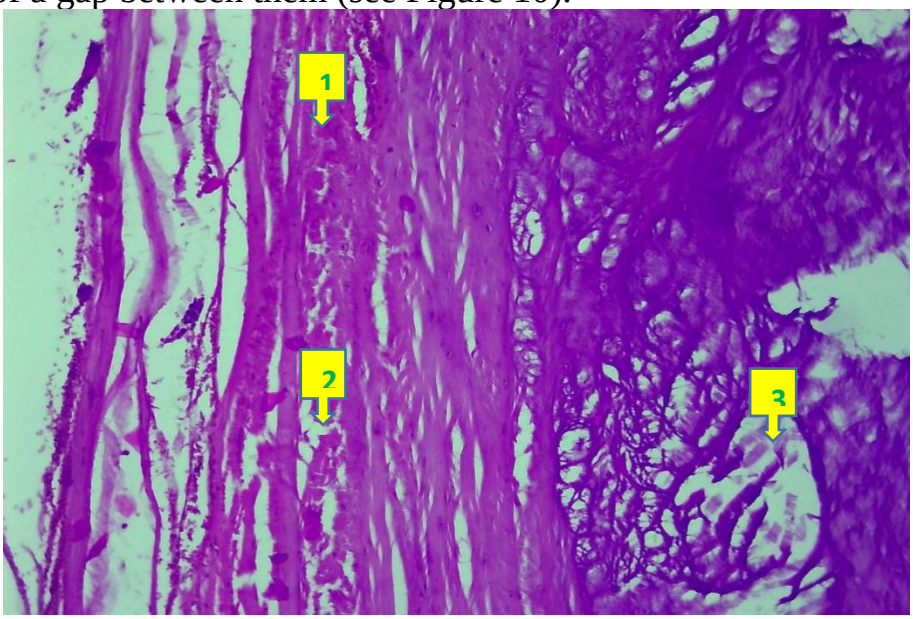
Specific changes were found in the outer surface of the vertebral disc, i.e., in the areas adjacent to the vertebrae, i.e., the presence of islets in which the bone marrow was deeply embedded in the connective tissue. These bone marrow islets were found to contain an infiltrate composed of monocytic and histiocytic cells. The infiltrate is composed mainly of monocytes, polyblasts, chondroblasts and osteoblasts. On the surface where the bone and dense connective tissue are connected to each other, it is determined that they have thinned areas and that there is a fibrous chondroid substance in the form of islands of different sizes. Relatively large chondrocytes are located in the connective tissue around these islands. Some of the islets are absorbed, shrink, and shrink into cavities filled with calcined matter.

§4.2. Pathomorphological changes that develop as a result of protrusion of the vertebral disc

In the initial period of dystrophic and degenerative changes in the structure of the intervertebral disc, pathological processes were observed to develop simultaneously in all morphofunctional parts of the disc. But the degree of development of pathological processes varies. Initially, when we consider the changes in the tissue of the outer fibrous ring, in this layer, mainly swelling of the intermediate substance and rupture of the tumor of the collagen fibers were observed. It was found that the tumor process developed strongly in the outer

layers of the fibrous ring, resulting in the separation of collagen fibers and the formation of a gap between them (see Figure 10).



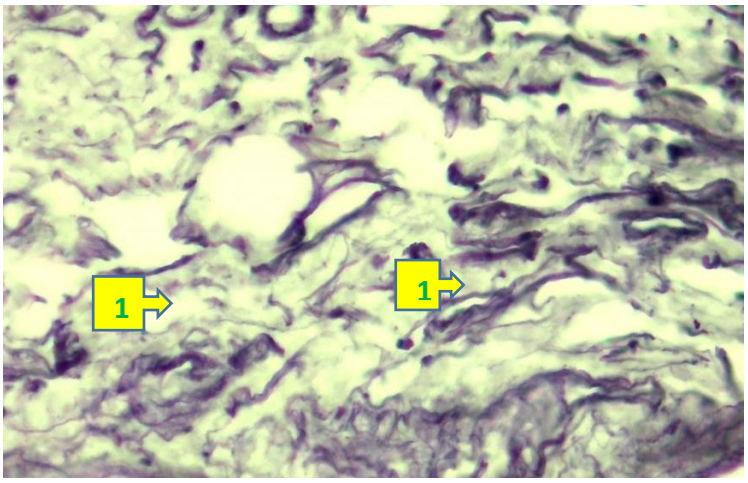
10-Picture. Spinal disc protrusion. The fibrous ring (1) is swollen and shriveled (2), the border with the vitreous nucleus is strongly destroyed (3).Paint: G-E. X: 10x10

It was observed that some collagen fibers were broken down, while others were exposed to myxamatosis. The inner layers of the fibrous ring are relatively dense, the tumor in the interstitial material is underdeveloped, the tufts that connect them to each other are not broken with a slight tearing of the collagen fibers. The homogeneity of collagen fibers is preserved. It is observed that the layer between the fibrous ring and the central residual nucleus undergoes severe degenerative and dystrophic changes. The connective tissue in this area is very strongly swollen, as a result of which the collagen fibrous tufts become thinner and expand in the form of a fragmented network. The chondrocytes between them are strongly swollen and the cytoplasm and nucleus are cytorexys and karyorexis, as a result of which the histostructure of chondrocytes is not defined. relatively retained its coloring (see Fig. 11).

11-Picture. Spinal disc protrusion. Collagen fibrous tufts in the fibrous ring (1) were torn, and staining with picrofuxin was reduced (2) paint: van Gizon X:10x40

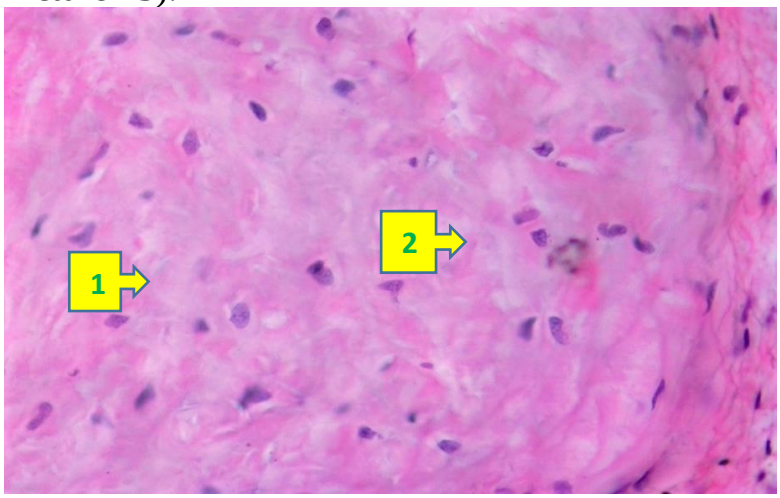
Because of the swelling, the tufts of collagen fibers are not stained to the same extent as picrofuxin, some areas are dark red, others are darker, and areas adjacent to the intermediate are dyed light purple. Thus, it can be said that due to the tumor, protein dystrophy developed from the collagen fibers, and some areas of the intermediate and fibers were hydrated.

In the fibrous ring, the collagen fibers form special plates and are placed parallel to each other, while the elastic fibers are located radially relative to the rings and serve to maintain the shape of the disc after movement. To determine the extent to which the elastic fibers in the fibrous ring were altered in protrusion disease, the elastic fibers were stained with fuchsin in the Wiegert method. It was found that the dark blue dyed elastic fibers in the fibrous ring changed their direction and were located chaotically, in one place low and thin, in another large and thick, bluish-gray dyed fibers (see Fig. 12). the presence of cavities of different sizes indicates the development of tumors and dystrophic processes in the tissue, and as a result the elastic fibers also changed their histotopography.



Picture 12. Fibrous ring of the tibial disc in protrusion. The dark blue dyed elastic fibers (1) are located in different directions and at different thicknesses. Dye: Weigert method. X: 10x90.

The area between the fibrous ring and the residual nucleus is composed of connective tissue rich in chondrocyte cells. With the development of protrusion, the development of pathomorphological changes in this layer was also detected. First of all, it is observed that the background of this layer in the general hematoxylin-eosin dye is darker, the collagen fibers in it are torn, fragmented and disordered (see Picture 13).

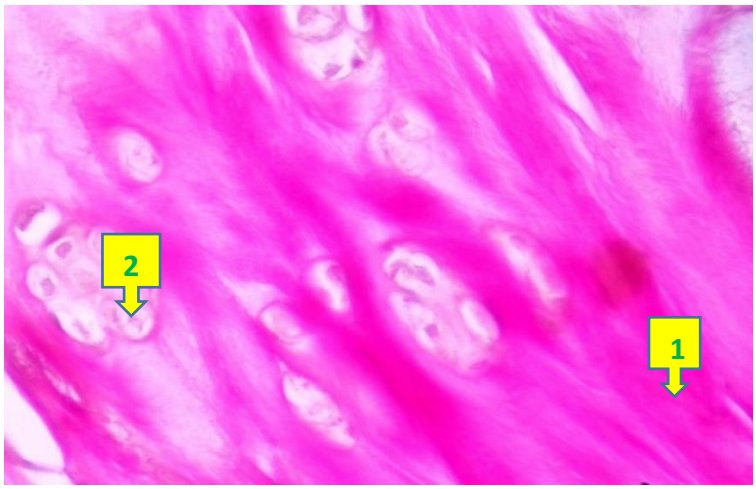


Picture-13. Protrusion, fibrous ring, and interstitial nucleus interstitial cell tissue (1) were associated with tumor, myxamatosis (2).
Paint: G-E. X: 10x10.

This is because the collagen fibers are dyed sharper because they are prone to protein dystrophy and the intermediate is prone to myxamatosis. Cells in this layer have changed their morphofunctional state due to dystrophy of the surrounding tissue. In this case, the protein glycans in the intermediate are broken down as a

result of dystrophy and the amount is reduced. It is observed that the nuclei of chondrocytes come in different sizes and shapes. Their chromatin is also lightly or darkly stained with hematoxylin to varying degrees, which also depends on the process of dystrophy in the nucleus. At the left edge of Figure 4.10, a portion of the fibrous ring is lowered, in which the collagen fibers are also sparse and sparse due to swelling. When the connective tissue cells in between are morphofunctionally activated, the nuclei are stained relatively darker with hematoxylin.

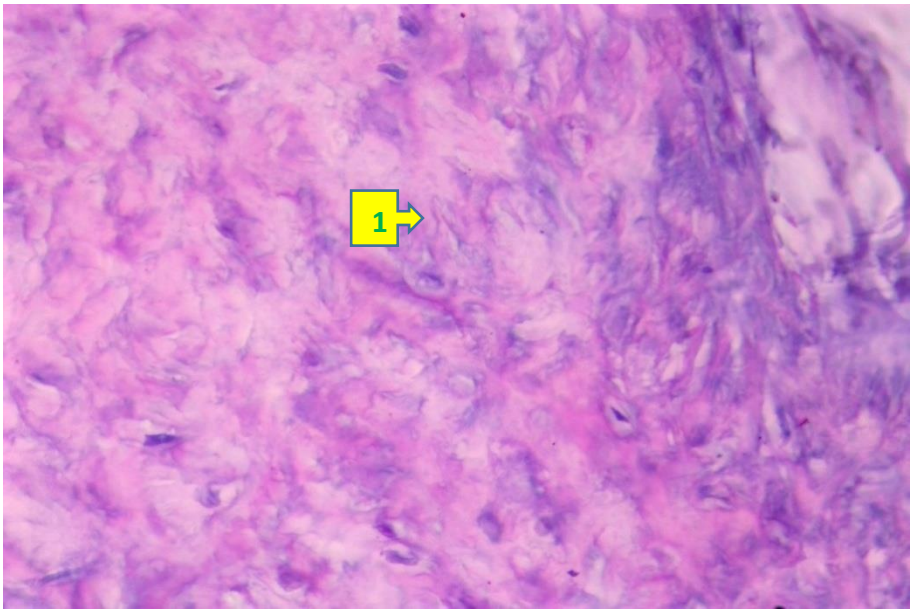
When this layer was dyed by histochemical method, i.e., collagen fibers with picrofuxin, it was found that the tuft of collagen fibers was dyed red to varying degrees. The fibers around the set of chondrocyte cells are relatively thinner, and those that are farther away are darker. In the dark-stained areas, the collagen fibers joined together to form a homogeneous substance. In less stained areas, collagen fibers are sparse, fragmented, in rexis and lysis, and between 2 and 6 cells are found in chondrocyte clusters between collagen fibrous tufts (see Figure 14). condition, the resulting nuclei are determined in the state of karyopyknosis and karyolysis.



14-Picture.In the protrusive, fibrous ring, and interstitial nucleus intercellular interstitial tissue area, collagen fibers (1) are variously stained with picrofuccin, chondrocytes (2) are in a state of tumor, karyopycnosis, and karyolysis. Paint: van Gizon. X: 10x40.

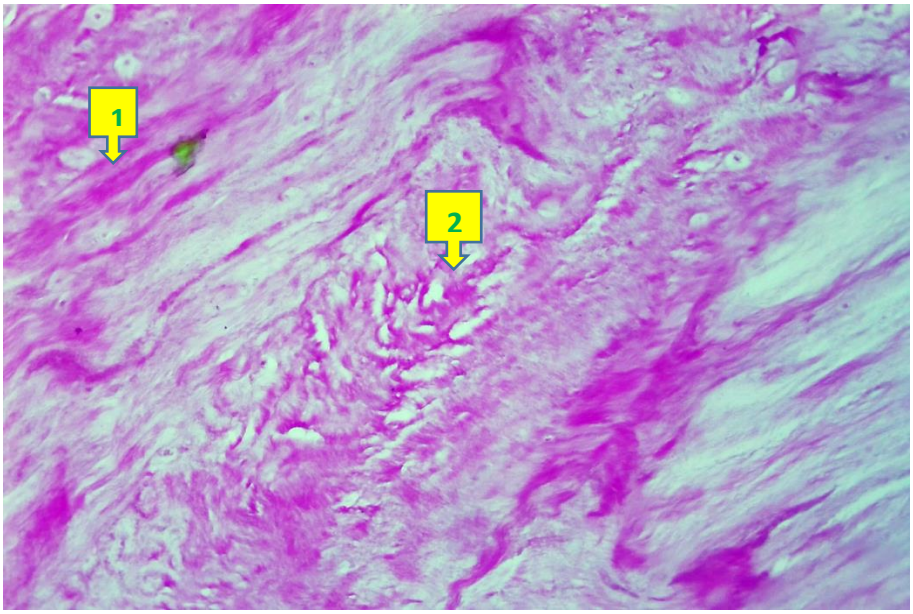
In order to determine the morphofunctional state of elastic fibers by fugselin in the Weigert method in the case of protrusion of cellular interstitial tissue between the fibrous ring and the residual nucleus, it was found that in the area adjacent to the fibrous ring, more elastic fibers, ie blue dyed fibers predominate. On the side facing the vibrating nucleus, however, the elastic fibers are lysed, leaving a boundary in the general background of the tissue, appearing to be bluish in the form of a diffuse substance (see Fig. 15). The fibrous structures in this layer of tissue are lysed (broken down) and the cells are severely dystrophic. In this

case, the chondrocytes are in small quantities, and all of them are in a state of necrobiosis, ie the cytoplasm is swollen and lysed, the nucleus changes shape, decreases chromatin, and is indistinctly stained with hematoxylin.



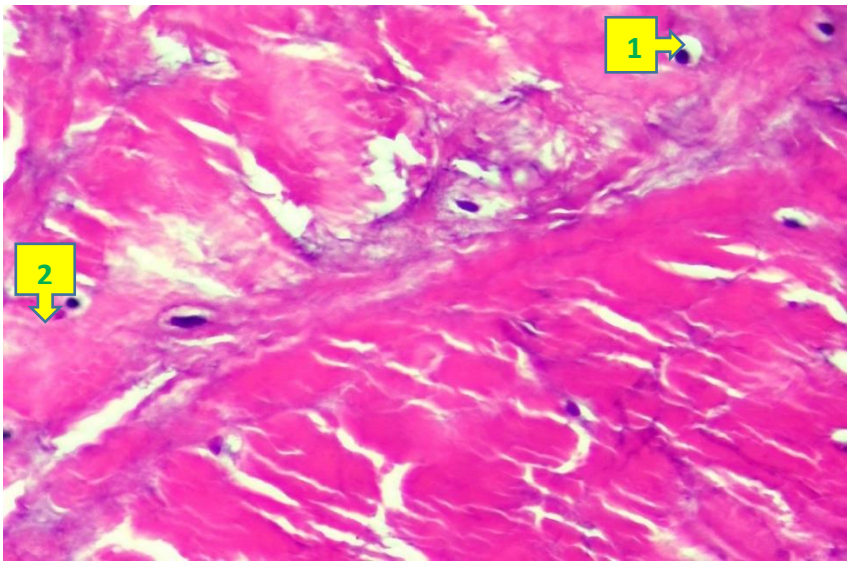
15-Picture In the interstitial fibrous tissue between the protrusion, the fibrous ring, and the fibrous nucleus, the elastic fibers (1) are broken down, lysed, and stained a light blue color. Dye: Weigert method. X: 10x40.

The intervertebral disc is composed of connective tissue with gel properties in terms of the composition of the residual nucleus of the disc, i.e. an intermediate consisting of collagen fibers, chondrocytes, mucopolysaccharides containing protein glycan. During the initial period of degenerative and dystrophic processes that develop in the vibrating nucleus, ie in protrusion, the vibrating nucleus also undergoes changes in terms of quantity and structure. Protrusion revealed that in the living nucleus, as in other parts of the disc, there is a strong interstitial tumor, destruction of fibrous structures, protein and carbohydrate dystrophy of the cellular structure (see Figure 16). In fact, in the residual nucleus, where the fibrous structures are disordered, the collagen fibers are found to be densely and darkly dyed in some places, sparsely and lightly dyed in others, and broken and destroyed in others. The fact that the intermediate also has irregular light and dark areas is due to the disorganization of the mucopolysaccharides in it. Due to the presence of protrusion in the nucleus accumbent, the cell composition is sharply reduced, histologically occasionally destroyed in the area, and isolated chondrocytes are detected. The cytoplasm of these cells is sharply enlarged due to edema and vacuolar dystrophy, turned into a balloon, the nuclei are in a state of karyopyknotic and karyolysis.



16-Picture. Protrusion, the intervertebral disc, the nucleus accumbens. All tissue structures are irregular and located in varying amounts, collagen fibers (1) are abundant in some places, scarce in other places, and destroyed (2). Paint: G-E. X: 10x10.

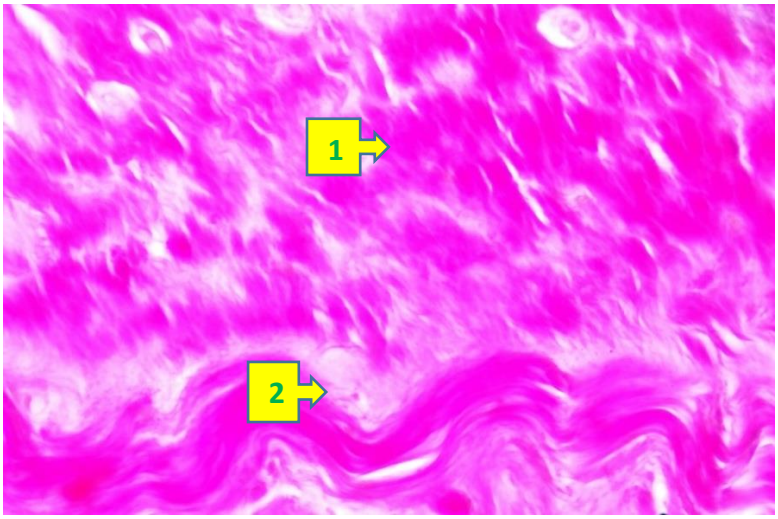
When viewed under a large microscope, the cells and fibrous structures in the living nucleus are more clearly visible. One of the changes that is characteristic of protrusion is the swelling and myxamatosis of the intermediate in the areas where the cells have accumulated. It is observed that chondrocytes undergo degenerative changes of different sizes and at different levels. Their cytoplasm is vacuolated, some fused with a ruptured intermediate. The nuclei are of different shapes, i.e., one is round, the other is elongated and karyopyknosis, a state of karyolysis is detected (see Pic. 17). It is observed that collagen fibers combine with each other as they are destroyed and become a homogeneous substance in the general case.



17-Picture.Tumor and vacuolation of the cytoplasm of chondrocytes (1) in the disc residual nucleus, karyopycnosis (2) and karyolysis.
Paint: G-E. X: 10x40.

In order to study the morphofunctional state of collagen fibers in the nucleus accumbens, this condition was detected when stained with a special histochemical staining method, i.e. van-Gizon method with picrofuxin. As shown above, a bunch of collagen fibers in this layer are located in different directions. When protrusion develops, the transverse collagen fibers are more degenerated, ie the intermediate is swollen and myxamatose, the fibers are torn, destroyed, and in some places lysed (see Figure 18). The longitudinally located fibrous tufts are curved, but most of them retain their morphofunctional state, only in some places they are slightly torn and the color is darker.

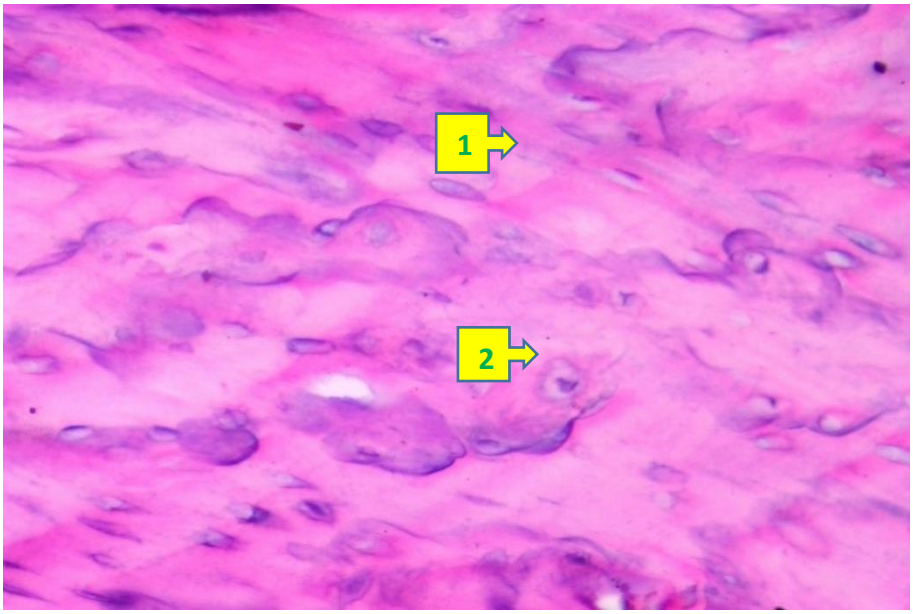
In fact, elastic fibers are rare in the spinal cord of the intervertebral disc. The study of the morphofunctional state of elastic fibers when staining disc tissue removed with fuchselin in the case of protrusion developed showed that although the elastic fibers were small, they were located around the chondrocyte cells and under the influence of disease their size decreased and staining. (see Picture 18).



18-Picture.When the vibrating nucleus collagen fibers are stained with picrofuxin (1), it is observed that the transverse ones are more degenerated (2). Paint: van Gizon. X: 10x40.

During the development of the process of protrusion in the initial period of dystrophic and degenerative changes in the structure of the intervertebral disc, pathological processes are observed simultaneously developing in all morphofunctional parts of the disc. But the degree of development of pathological processes varies. Pathomorphological changes, such as more prominent edema, myxamatosis, and fibrous rupture, are observed to develop in the outer fibrous ring. The elastic fibers in it violate their normal position and appear in the form of dark blue structures in different directions and thicknesses. In the cell layer below it, these changes lead to the development of edema and myxomatosis, as a result of which chondrocytes also suffer from dystrophy and necrobiosis. In the vibrating nucleus, on the other hand, it is observed that the collagen fibrous tufts change their direction and become slightly fragmented, the amount of elastic fibers decreases, and they remain only around the cells. The essence of these pathomorphological changes is the secondary destruction of the surrounding fibrous structures from protein and carbohydrate dystrophy ofmucopolysaccharide such as proteolycans in

the interstitial substance of the disc..



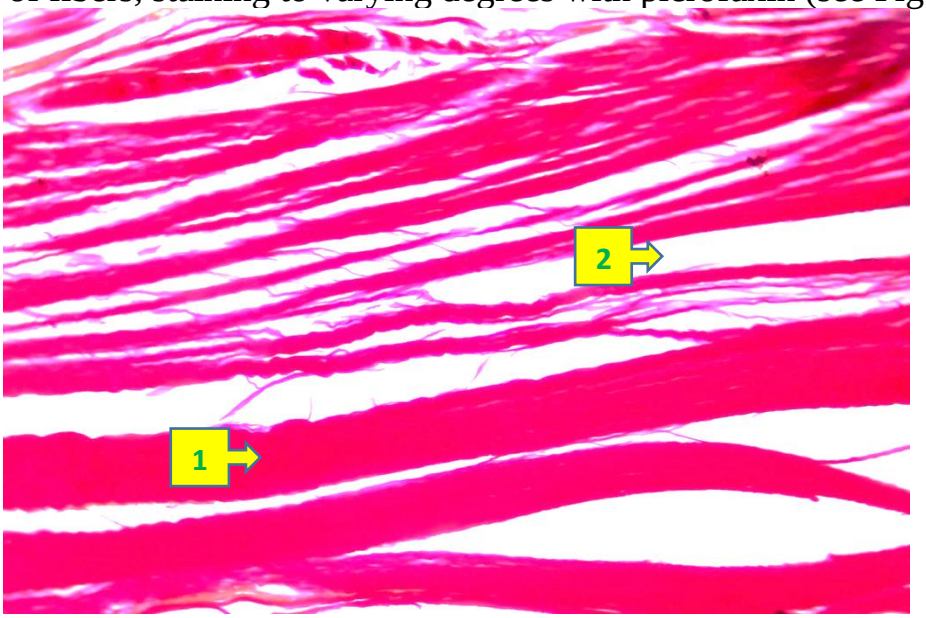
19-Picture. When the elastic fibers in the vibrating nucleus are stained with fuchselin, it is observed that their volume is reduced and they are arranged in a circle around the cells (1). Dye: Weigert method. X: 10x40.

Degenerative changes in intervertebral disc protrusion begin suddenly and to varying degrees in all morphofunctional parts, edema, myxamatosis, fibrous dystrophy predominate in the fibrous ring, and in the resilient nucleus from the interstitial tumor, collagen fiber bundles change direction, a decrease in elastic fiber content is confirmed.

§4.3. Pathomorphological changes of spinal disc herniation

Histological study of the dynamics of normal and degenerative changes in the composition of the intervertebral disc helped to determine the morphogenesis of protrusions and hernias that develop in it. As noted above, the development of dystrophic and degenerative changes in the disc structure that do not lead to relatively superficial and severe destruction is noted when protrusion develops. It has been confirmed that these pathomorphological changes deepen, some of which are irreversible processes, i.e. destruction and inflammation in the fibrous ring, causing the destructively altered resilient nucleus to grow into the fibrous ring and rupture it. When a hernia developed, it was observed that almost the entire part of the external fibrous ring, often the posterior-lateral part, was more damaged and underwent severe destructive changes. It has been observed that these destructive and inflammatory changes include; the intermediate was confirmed to have severe swelling and myxamatosis, tearing and fragmentation of collagen fibers. The fibrosis ring consists of pathomorphological changes such as the growth of chondrocytes and connective tissue cells, disruption of the morphofunctional state of collagen and elastic fibers and a decrease in their amount. It has been confirmed

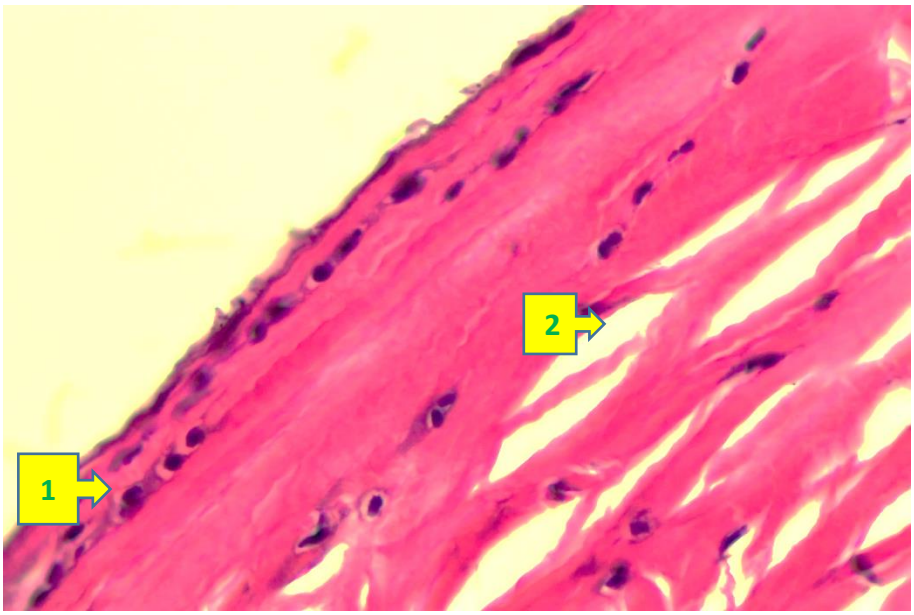
that one of the changes that develops in almost all areas of the fibrous ring is that the intermediate is subject to severe swelling and myxamatosis, tearing and destruction of fibers, staining to varying degrees with picrofuxin (see Fig. 20).



20-Picture. Strong tumor (2), myxamatosis, fibrous rupture and destruction of the hernia, fibrous ring collagen fiber (1) interstitial tufts. Paint: van Gizon. X: 10x40.

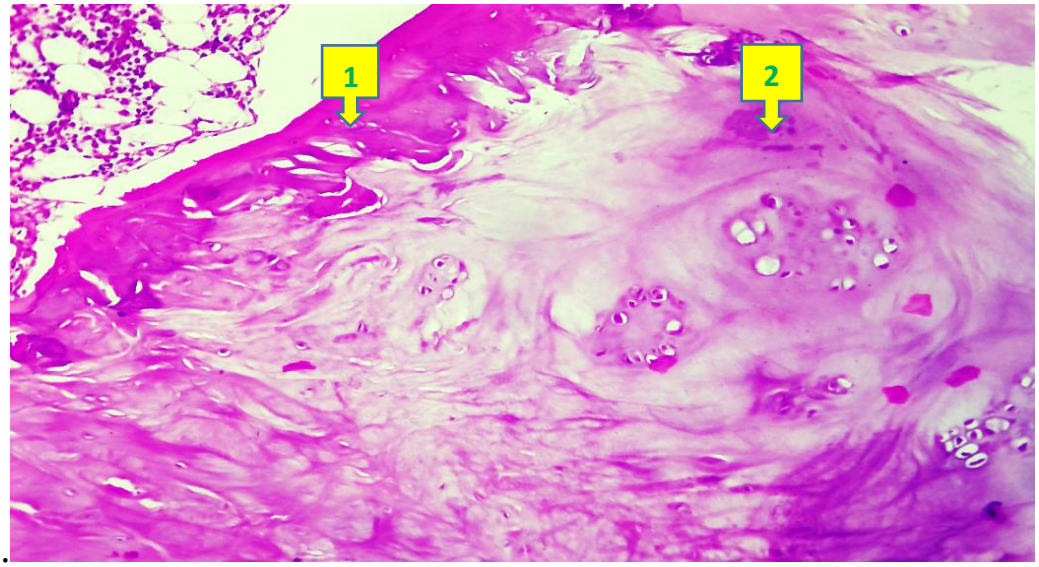
As another important pathomorphological change, it was observed that the fibrous ring grows from both the outer and inner side of the connective and connective tissue cells in order to provoke inflammation. It was found that the cells growing from the outside were mainly infiltrated by the interstitial tissue of several outer layers of the fibrous ring. It was observed that on the outer surface of the fibrous ring there is a dense set of cells.

As a result, it was found that these cells proliferated and became active, the nuclei became hypertrophied and became hyperchromatic (see Figure 21).



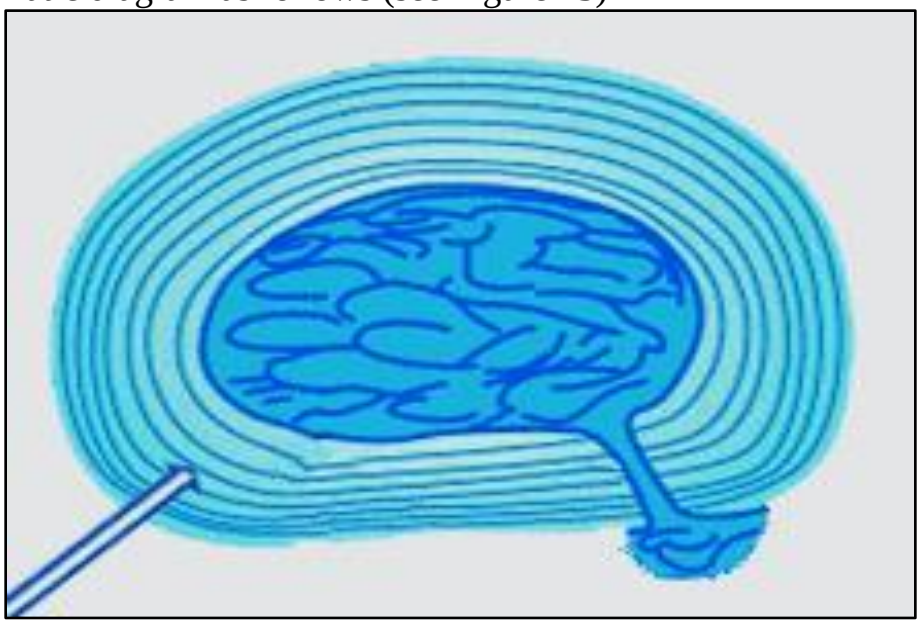
21-Picture. Hernia, proliferation of connective tissue cells on the outside of the fibrous ring (1), rupture of fibers (2). Paint: G-E. X: 10x40.

When the disc tissue removed with hernia is seen under a small lens under a microscope, it is observed that the outer fibrous ring of the disc is strongly destroyed and thinned, and in almost all areas there is an overgrowth of a layer of cells located on the side of the nucleus accumbens. As a result, the thickness of the fibrous ring changes, and from the growth of connective tissue on its inner surface, it is determined that the fibrous ring tissue contains sucker-like structures (see Figure 22).



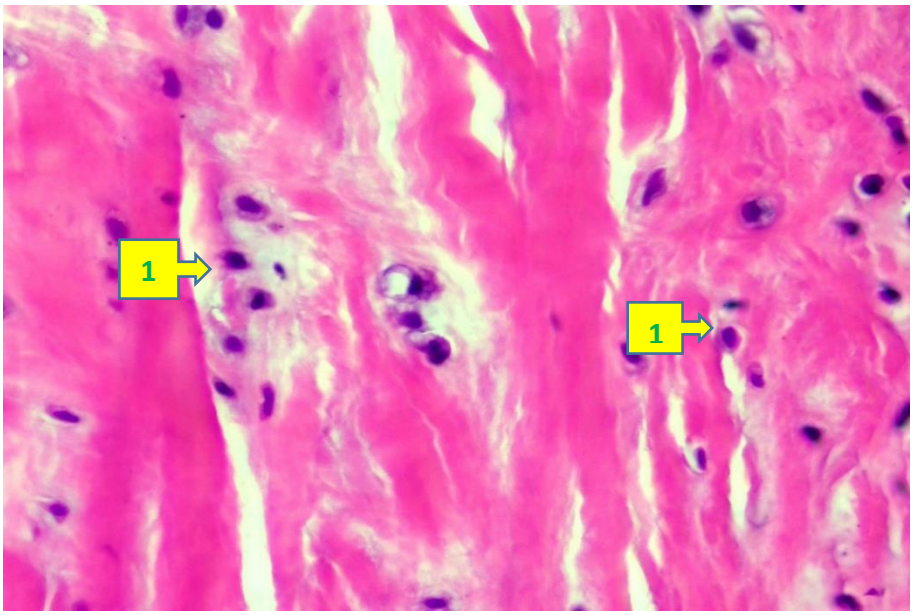
22-Picture.Hernia, thinning of the fibrous ring of the disc (1), rupture of some areas, swelling in the connective tissue (2), collagenolysis, vacuolar dystrophy of chondrocytes. Paint: G-E. X: 10x10.

Some areas of the fibrous ring are almost completely thinned, destroyed, and ruptured, and through this crack the connective tissue bulges out, which is shown in the schematic diagram as follows (see Figure 23)



23-Picture. Intervertebral disc rupture nucleus fibrous ring rupture and hernia development scheme.

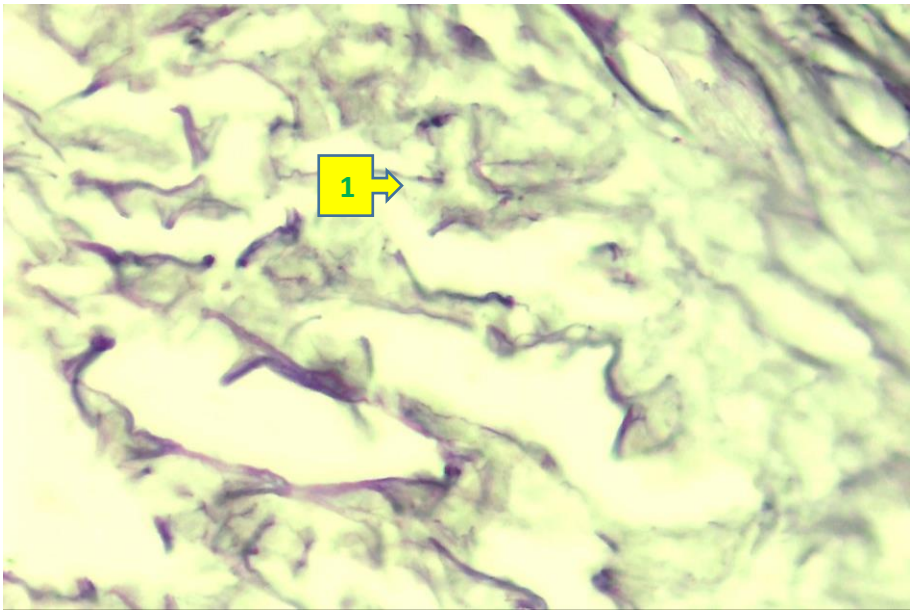
Strong degenerative and destructive changes in the structure of the connective tissue under the fibrous ring are also found. It is observed that the connective tissue is almost completely subjected to severe swelling and myxamatosis, the fibrous structures in it are broken down, lysed and painted a light color. It is found that the chondrocytes in this layer are pushed to one side, forming a cluster of cells located separately. It is observed that the chondrocyte cells are also strongly swollen, their cytoplasm is vacuolated, vesicles are formed, the nuclei are in a state of karyopyknosis and karyolysis. Examination of fibrous ring tissue under a large microscope revealed that connective tissue and connective tissue cells that had grown into it externally and internally were prevalent among the collagen fibrous tufts (see Figure 24).



24-Picture. Hernias, proliferated histiogenic cells in the fibrous ring (1). Paint: G-E. X: 10x40.

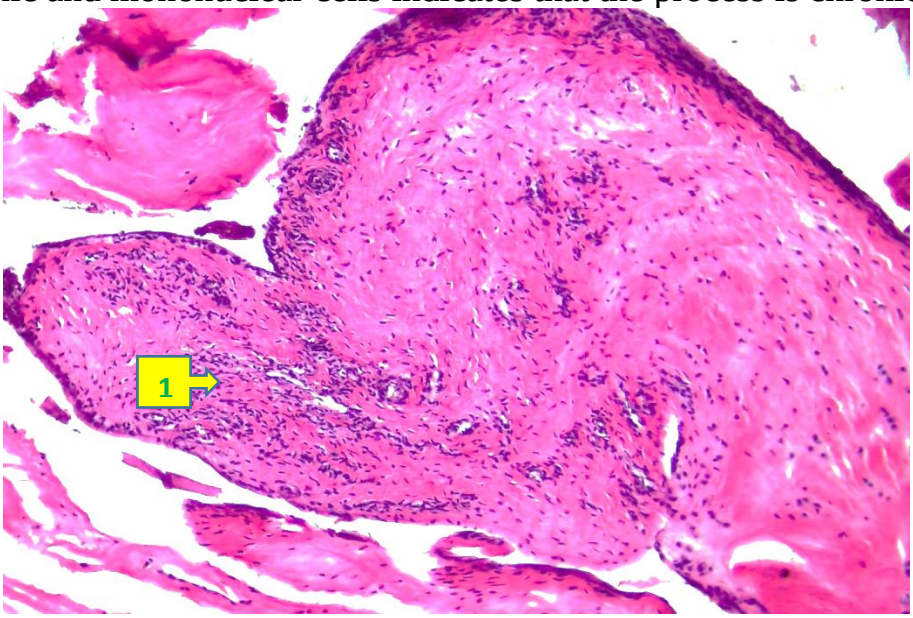
It was observed that the appearance of these cells intensified the destructive processes in the fibrous ring and caused the development of the inflammatory process. The state of active proliferation of histiocytic cells, hypertrophy and hyperchromosis of the nuclei, the development of tumors and exudation around their production of pro-inflammatory mediators.

When the fibrous ring tissue was stained by the histochemical method, which shows the morphofunctional state of the elastic fibers in it, ie by the Weigert method with fuchselin, it was found that the elastic fibers are located transversely to the collagen fibers in the fibrous ring and serve to increase its elasticity. In hernia, as mentioned above, the fibrous ring tissue is almost completely destroyed, as a result of which the elastic fibers in it also undergo dystrophy and degeneration, changing their morphofunctional state. Microscopically, the elastic fibers are chaotic, accumulated in one place, absent in another place, and the place is vacuolated, dark blue staining with fuchselin is disturbed, and light blue staining is observed in almost all areas (see Fig. 25)



25-Picture. Hernia, destruction and dislocation of elastic fibers (1) in the fibrous ring. Dye: Weigert method. X: 10x40.

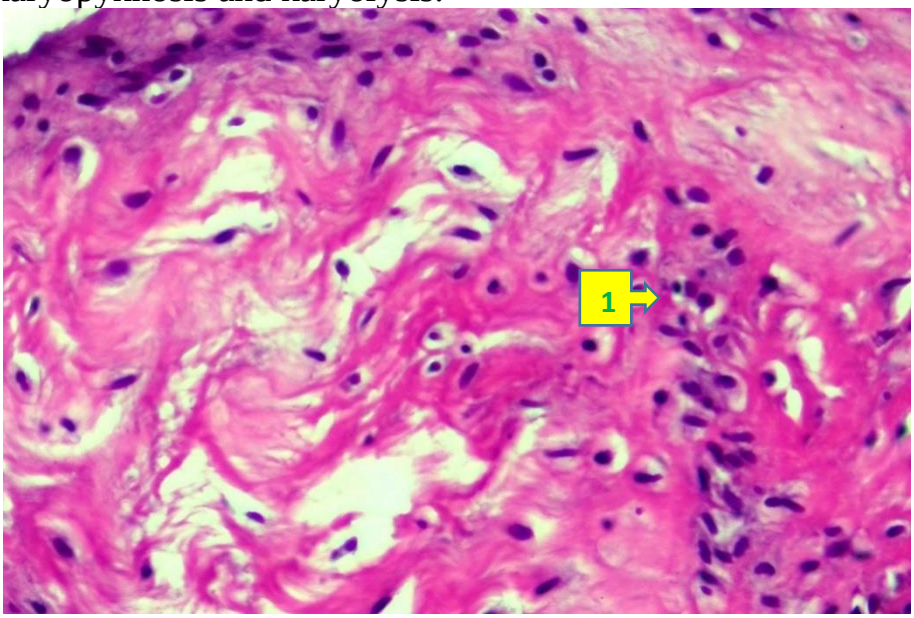
In addition to the strong destructive changes around the ruptured areas of the fibrous ring in the hernia, it is observed that an inflammatory infiltrate appears within the fibrous ring. In this case, the fibrous ring tissue is completely rebuilt and becomes an inflammatory infiltrate. That is, in the fibrous ring, thin-walled blood vessels proliferate and grow, and inflammatory infiltrates appear around them (see Figure 26). The fact that the inflammatory infiltrate is composed mainly of histiogenic and mononuclear cells indicates that the process is chronic.



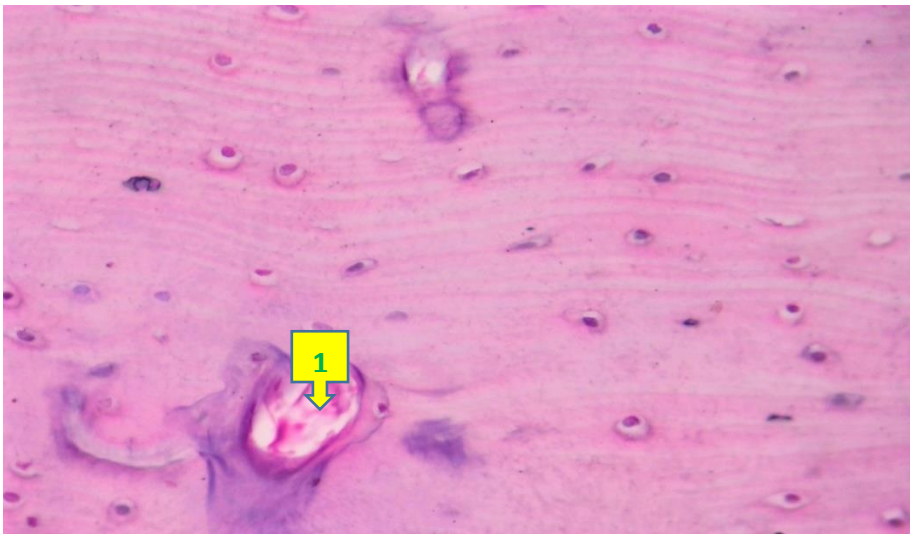
26-Picture. Hernia, the development of an inflammatory process (1) in the ruptured area of the fibrous ring. Paint: G-E. X: 10x10.

Inflammation of the fibrous ring has also spread to the underlying cellular connective tissue, with a complete change in its morphofunctional status. It is observed that in the connective tissue there is a separate set of cells, in which the connective tissue cells become chondroblasts and chondrocytes. It is observed that these cells are in a state of active proliferation, that is, their nuclei are hypertrophied, hyperchromasized, deformed and oval and elongated (see Fig. 27). It is determined that the connective tissue itself is completely destroyed, that is, the fibrous structures are broken and fragmented, and a strong tumor develops in the interstitial substance.

In some cases of hernia, the growth of blood vessels is detected in the disc, more precisely in its fibrous ring and the underlying connective tissue. It is observed that cracks and holes of different sizes appear in the connective tissue, proliferation of endothelial cells in their walls (see Figure 28), the development of dystrophy and destruction processes in the surrounding tissue. It is found that the connective tissue cells are relatively numerous, their cytoplasm is vacuolated, the nucleus is karyopyknosis and karyolysis.

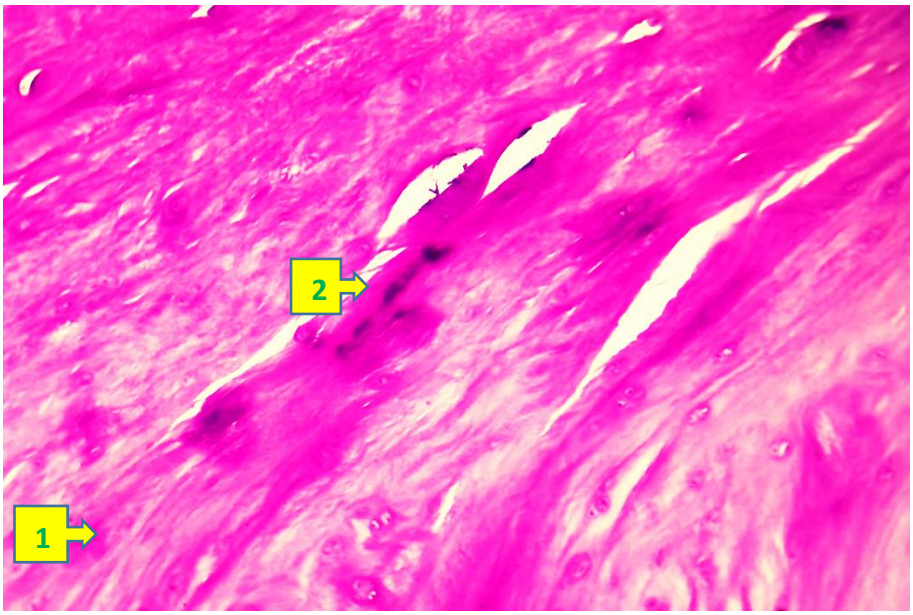


27-Picture.Hernia, the appearance of inflamattory cells (1) in the fibrous ring subcutaneous tissue. Paint:G-E. X 10x10



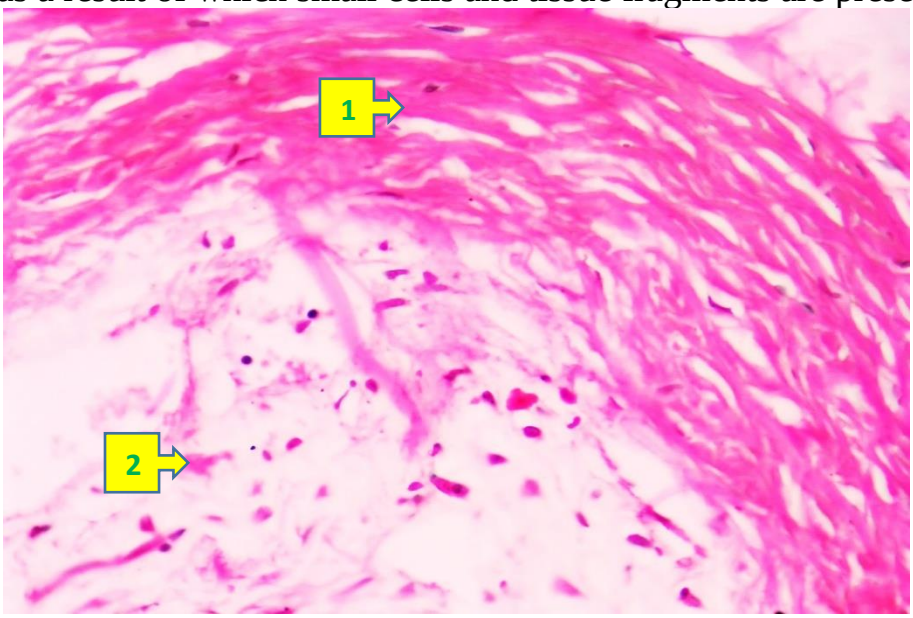
28-Paint. Hernia is the appearance of blood vessels (1) in the disc connective tissue. Paint: G-E. X: 10x40.

When van-Gizon staining with a special picrofuxin to study the morphofunctional state of fibrous structures in fibrous subcutaneous connective tissue, it was found that the fibrous structures in the tissue were stained to varying degrees due to strong dystrophic and destructive changes in them. In some places it is observed that the fibrous structures in these areas are dyed dark red and merge with each other to form a homogeneous coarse protein substance. Elsewhere, it is observed that the mucopolysaccharides and proteoglycans in the intermediate content are dystrophic and develop edema and myxomatosis. As a result, the chondrocytes between them are almost invisible, because their cytoplasm is swollen, vacuolated and destroyed, the nuclei are karyopyknosis and karyolysis. It should be noted that in addition to these pathomorphological changes, calcinosis develops in some areas of the tissue, and dark blue stained areas appear (see Figure 29)



29-Picture. Hernia tissue, collagen fibers (1) randomly stained with picrofuccin, calcinosis (2) developed in some areas.
Paint: van Gizon. X: 10x40.

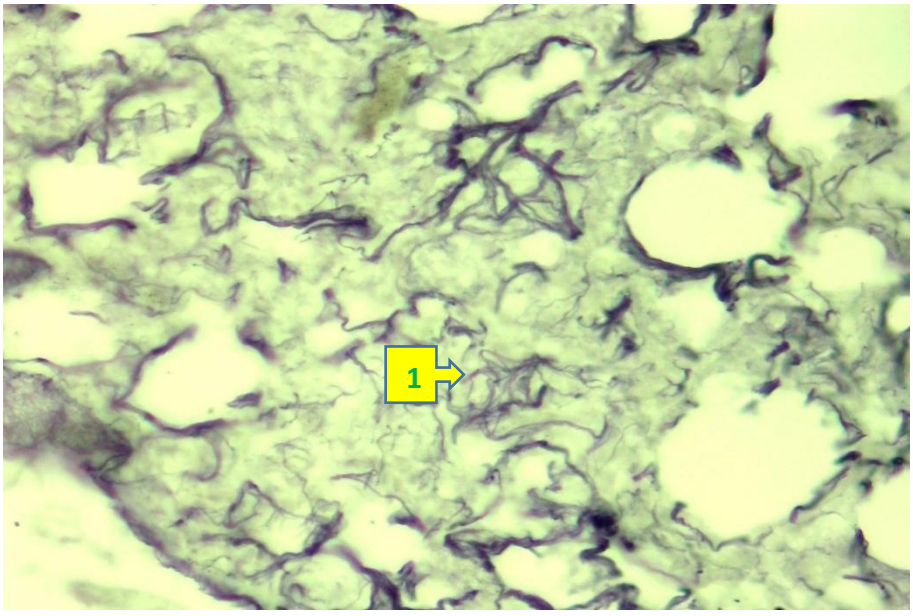
In contrast to the pathomorphological changes described above, specific changes were observed in the biopsy material of the hernia. In this case, the fibrous ring is intact, but in its composition developed a strong tumor and myxomatous processes. As a result, it is determined that the collagen fibrous tufts are crushed, deformed, some of them are broken, lysed and destroyed (see Figure 30). It is observed that the cellular connective tissue under the fibrous ring is almost completely lysed and destroyed, as a result of which small cells and tissue fragments are preserved.



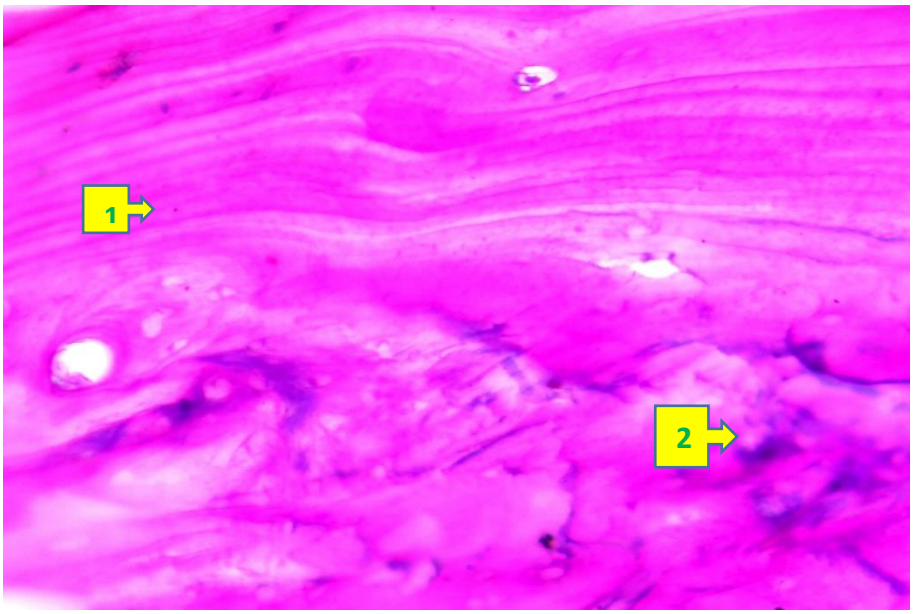
30-Picture. Hernia material, swelling and tearing of the fibrous ring (1), complete lysis and destruction of connective tissue (2). Paint: G-E. X: 10x40.

Histochemical staining with fuchselin, which shows the morphofunctional state of the elastic fibers in the connective tissue under the fibrous ring in hernia, revealed a sharp decrease in the amount of elastic fibers in the tissue, and the remaining ones are destroyed and disorganized. It is found that the elastic fibers in most areas are fragmented, disrupting their morphofunctional state, dyed many and dark blue in some places, and hungry or incomplete in others (see Fig. 31).

The development of specific pathomorphological changes in the structure of the hernia nucleus is also observed. Initially, water escapes from the residual nucleus, and the remaining protein and carbohydrate content condense, and this process continues as the substances undergo dystrophy and destruction. Morphologically, the living tissue is dense and homogenized, most areas become rough, and calcinosis develops in some areas (see Figure 32).



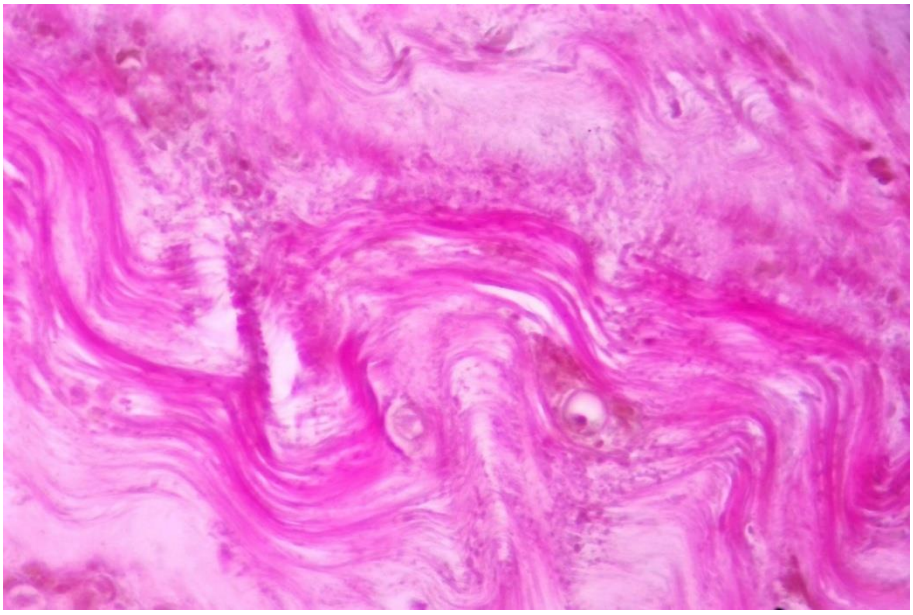
31-Picture.Hernia material, fragmentation of elastic fibers (1), disordered placement. Dye:Weigert method. X:10x40



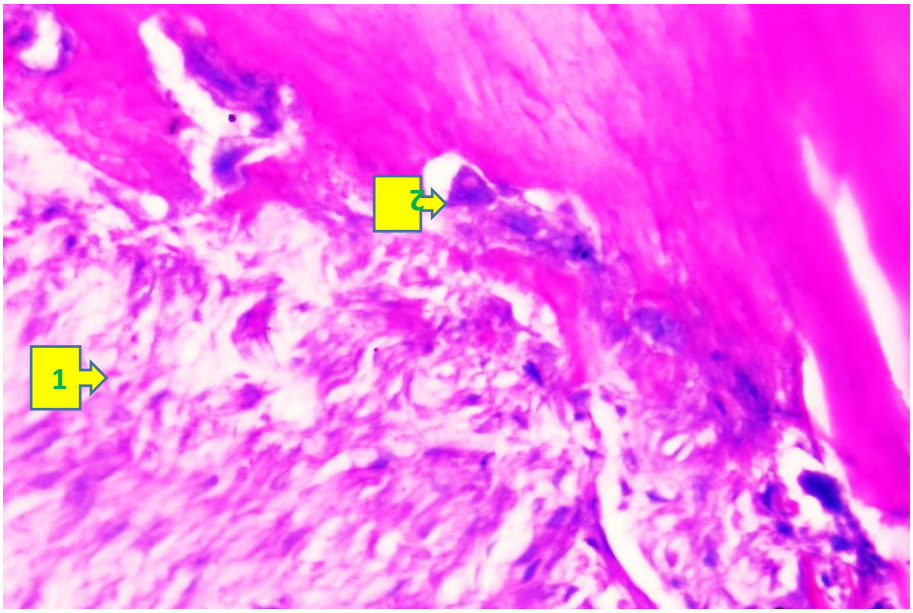
32-Picture. Hernia material, thickening of the nucleus accumbens tissue (1), homogenization of proteins, the appearance of foci of calcification (2). Paint: G-E. X: 10x40.

When the vibrating nucleus is stained with a special histochemical dye, i.e., picrofuxin, by the van-Gizon method, the following pathomorphological changes are detected; the disordered arrangement of collagen fibers, while some fibrous tufts are preserved, they are observed to be curved and strongly fragmented and destroyed. The remaining fibrous structures are almost completely disintegrated, lysed, destroyed, and converted into fine-grained substances (see Figure 33). In

this case, it is determined that in the composition of this granularly decomposed substance appeared relatively dark-stained inclusions and pigmented substances with picrofuxin.



33-Picture. The hernia material is a disordered arrangement of fibrous structures (1) when stained with picrofuxin, disintegrating and turning into a homogeneous granular substance (2). Paint: G-E. X: 10x40



34-Picture. Hernia material, complete disintegration, lysis (1), destruction of the vitreous nucleus, the development of calcinosis (2). Paint: G-E. X: 10x40.

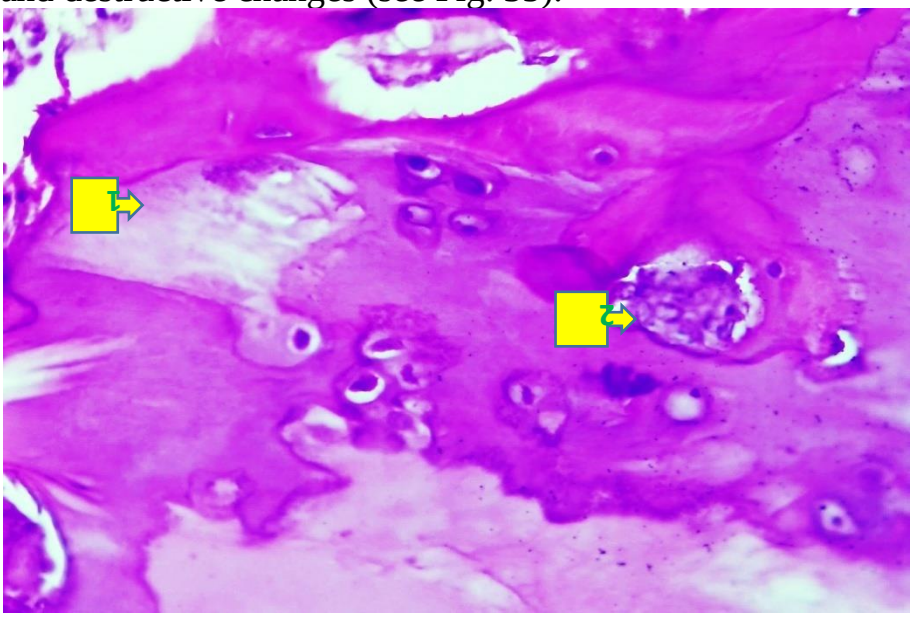
When the hernia persists for a long time, even deeper changes are observed in the structure of the disc, which undergoes pathomorphological changes. In this case, it

is observed that the living nucleus is completely disintegrated, lysed and destroyed, the fibrous structures in it are almost completely disintegrated, and without structure it becomes a coarse necrobiotic substance (see Fig. 34). The development of multicellular calcinoses is detected in the residual nucleus, which underwent such a completely destroyed pathomorphological change.

§4.4. Pathomorphological changes in sequestrated hernia fragments

In this chapter, the material removed during surgery for a sequestrated hernia includes a portion of the resuscitative nucleus sequestrated into the spinal canal, a portion of the resilient nucleus hanging out of the ruptured area of the fibrous ring, two sides of the ruptured area of the fibrous ring, sometimes part of the posterior longitudinal ligament. and it was confirmed that part of the ridge plate covering the top had been removed. These materials were placed in separate paraffin blocks, histological incisions were prepared and stained and examined under a microscope. The study revealed that the sequestered part of the resilient nucleus was initially examined. It was found that the sequestration contained separate parts of the living nucleus, which developed various types of destructive, necrobiotic, inflammatory and fibrous processes.

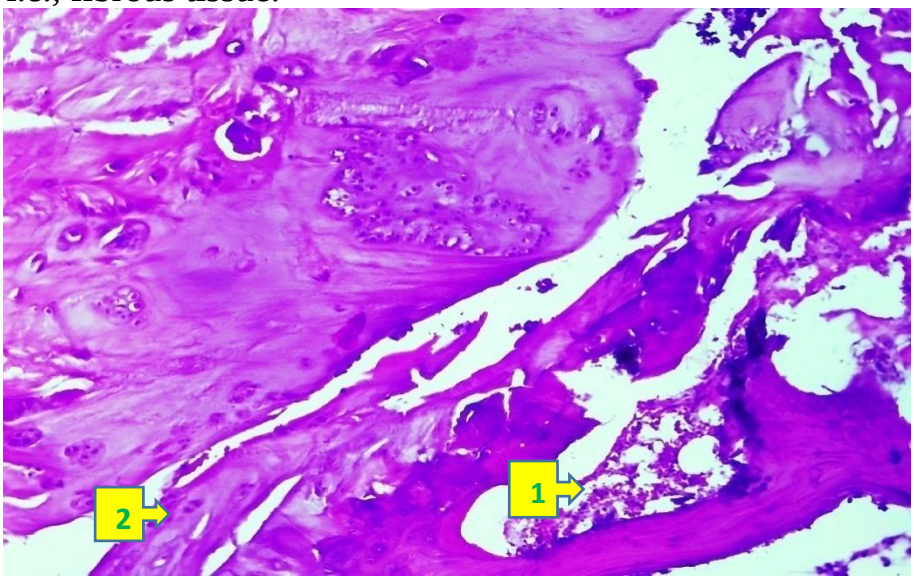
First, we present the results of microscopic analysis of several samples from the sequestrated parts of the resilient nucleus surgically removed. The composition of the sequestration piece is found to consist mainly of connective tissue, but in which the cells are arranged irregularly, almost all of which have undergone dystrophic and destructive changes (see Fig. 35).



35-Picture. Hernia sequestration, connective tissue that has undergone complete degeneration (1) and destruction (2). Paint: G-E. X: 10x40.

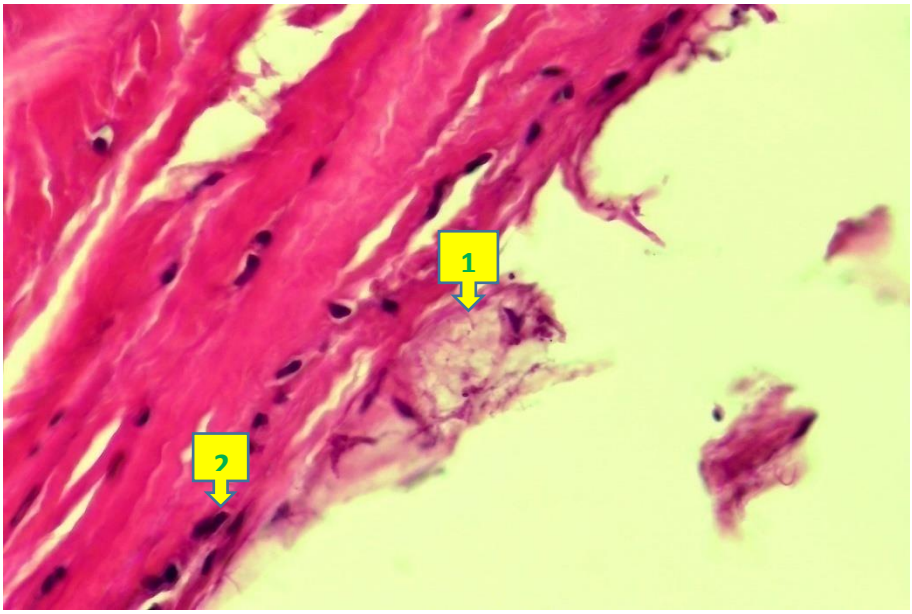
While the cytoplasm of one was vacuolated and turned into vesicles, the others underwent necrosis and accumulated in one place, forming tissue detritus. The nuclei of these cells undergo karyopyknosis, karyorexis and karyolysis, some of them are necrotic, calcinosis develops in necrotic detritus. Collagen fibers, which are a major component of connective tissue, have also been found to be completely degenerated and destroyed, turning into a relatively homogeneous coarse substance stained darkly with eosin.

Examination of the next part of the hernia sequestration under a microscope revealed the presence of not only destructive connective tissue, but also fibrous and bony tissue. In the sequestrated connective tissue, as described above, the cells are destroyed and necrobiotic, the intermediate substance is vacuolated, and the collagen fibers become rough in appearance. It is surrounded by chronic inflammatory infiltrate, i.e. mainly histiocytic infiltrate
(See Figure 36). It is observed that part of the infiltrate becomes a connective tissue scar, i.e., fibrous tissue.



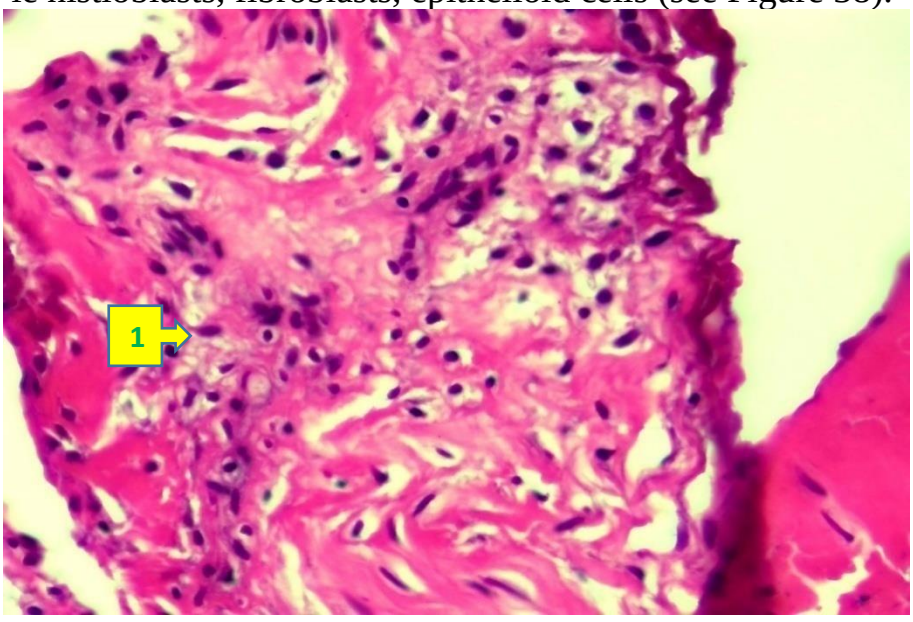
36-Picture. Sequestered hernia, inflammatory infiltrate with destructive uncle (1) and fibrous tissue (2).

Examination of the removed fibrous ring piece under a microscope revealed the presence of fragments that were destroyed, necrobiotic and in the form of fibrinoid necrosis. The presence of inflammatory infiltrates on the outer and inner surface of the fibrous ring, as described above, was detected (see Fig. 37). Inflammatory cells were also found to grow between the fibrous ring fibrous structures and to proliferate and become active.



37-Picture. Sequestered hernia, necrosis on the outer surface of the fibrous ring (1) and inflammatory infiltrate (2). Paint: G-E. X: 10x40.

Examination of another part of the fibrous ring revealed that it was almost completely covered with an inflammatory infiltrate and had become a chronic inflammatory infiltrate. Inflammatory cells are found to be composed mainly of histiocytes, ie histioblasts, fibroblasts, epithelioid cells (see Figure 38).

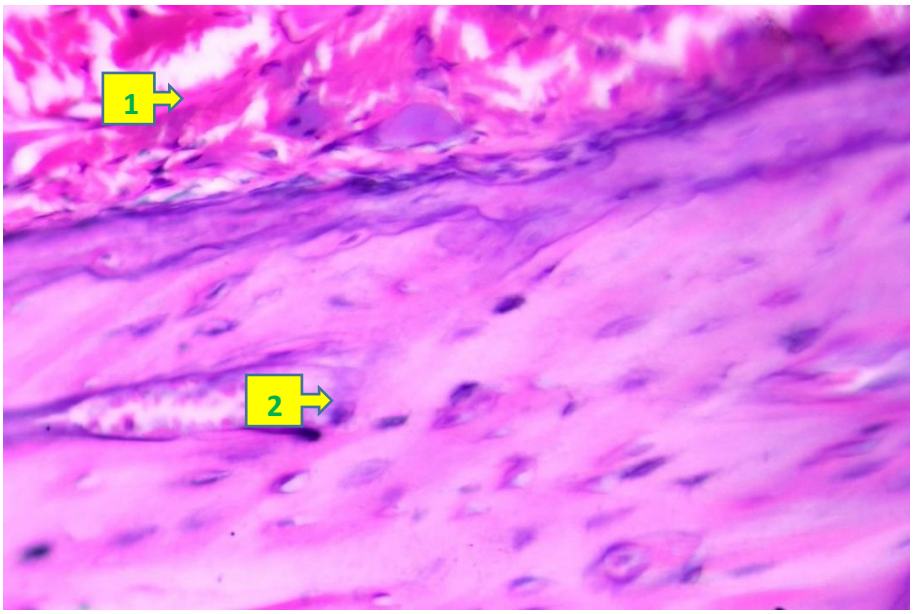


38-Picture. A piece of sequestered hernia, the fibrous ring is completely covered with an inflammatory infiltrate (1). Paint: G-E. X: 10x40.

The level of activity of these cells is such that their cytoplasm is vacuolated and enlarged due to a strong synthetic process, the nuclei are of different sizes, most of which are hypertrophied and hyperplasia. In this inflammatory infiltrate,

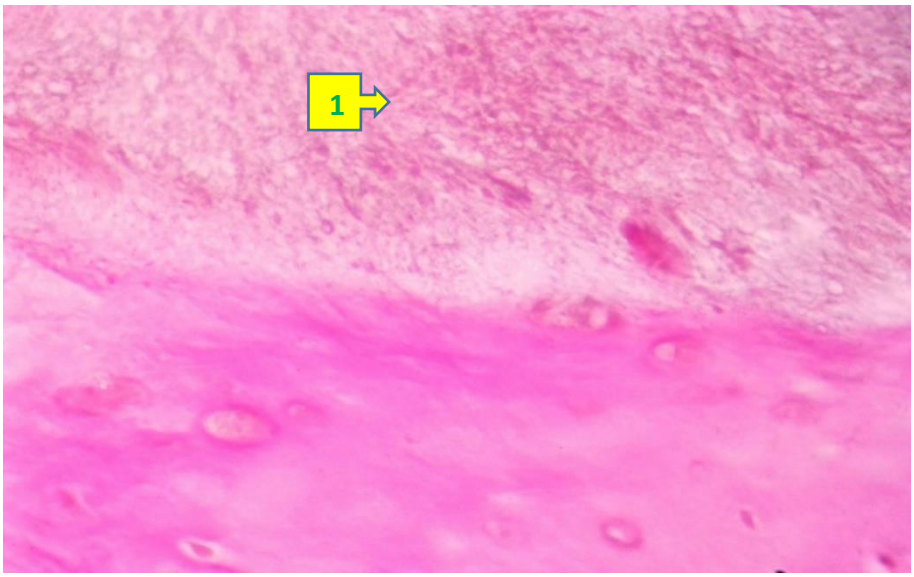
blood vessels have also formed, in which the cells in their wall are found to be in a strong proliferative state. As a result, there are areas where the intermediate substance and fibrous structures are broken down, fragmented, lysed due to the process of severe dystrophy and destruction, and the formation of coarse protein.

In some fragments it is observed that the fibrous ring is obtained by fusion with the resilient nucleus. In this case, it is determined that the fibrous structures in the tissue of the fibrous ring are broken, fragmented. In the living nucleus, the number of chondrocytes is increased, but they are found to be in a state of dystrophy and destruction (see Figure 39). It is observed that other connective tissue cells around some cells multiply as inflammatory cells and calcinosis develops around it. It is observed that thin-walled blood vessels form in the structure of this resilient nuclear tissue, and the cells in their wall are in a state of proliferative activation.



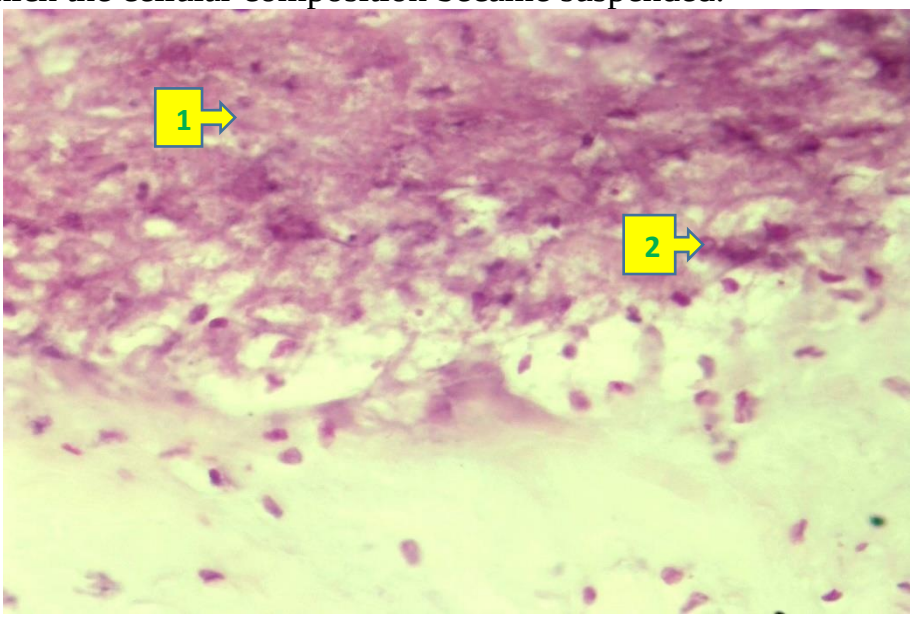
39-Picture. A sequestered hernia is a condition in which the fibrous ring (1) and the resilient nucleus (2) are joined together. Paint: G-E. X: 10x40.

In addition to the above, when sequestrated resuscitation nucleus fragments were examined under a microscope, it was observed that most of the resilient nucleus tissue was destroyed and necrotic, with necrotic tissue containing varying degrees of lysis and fragmentation of cell and tissue fragments (see Figure 40). Destructive and necrobiotic processes were also found to predominate in the connective tissue surrounding the necrosis site. It was found that the fibrous structures in the connective tissue were broken down and turned into a homogeneous coarse substance. It was observed that the cells in it were also in a state of necrobiosis, that is, the cytoplasm was vacuolated and formed into vesicles, the nucleus was karyolysis.



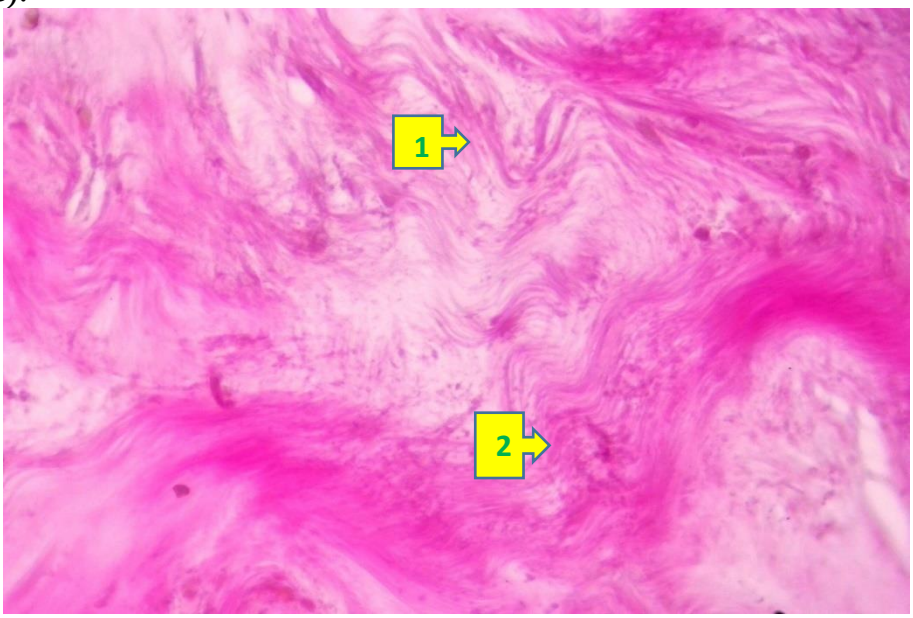
40-Picture. Sequestrated hernia, necrotic tissue of revived nucleus (1). Paint: G-E. X: 10x40.

Examination of another part of the sequestrated hernia under a microscope revealed that the process of necrosis developed in the residual nucleus was even more pronounced, the necrotic tissue was completely disintegrated and turned into unstructured detritus, calcined planes, coarse unstructured substance (see Fig. 41). In this case, it was found that the connective tissue around the necrosis, especially the border part, was strongly swollen, the connective tissue was fragmented, as a result of which the cellular composition became suspended.



41-Picture. Sequestrated hernia, exacerbation of necrosis of the nucleus accumbens (1), transformation into a rough substance and calcinosis (2). Paint: G-E. X: 10x40.

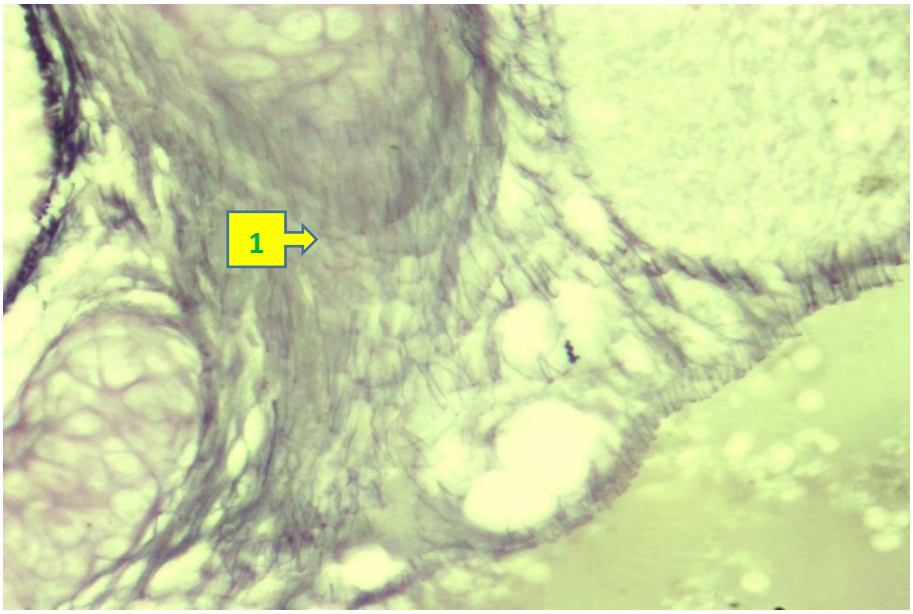
Microscopic examination of collagen fibers in sequestrated hernia fragments stained with a special dye, ie picrofuxin, by van-Gizon method, showed that the amount of collagen fibers in the residual nucleus was sharply reduced, and the surviving ones were disordered, but in a state of disintegration and destruction. (see picture).



42-Picture. Sequestrated hernia is a weak staining of collagen (1) fibers in the nucleus accumbens with picrofuxin, their destruction and transformation into a rough substance (2).

Fragmented fibers are observed to form a coarse-grained coarse substance, and it is found that it contains dark-colored protein droplets with fine and coarse eosin of various sizes.

When the elastic fibers of the sequestrated part of the intervertebral disc herniation were stained with a special dye, ie fugselin by the Weigert method, it was found that the elastic fibers of the vertebrae formed round shapes where the chondrocytes accumulated, stained a darker blue color. (see picture). In the cell-free areas of connective tissue, the elastic fibers are identified in the form of fibers of different orientations, fine and thin fibers stained a darker blue color, denser and darker blue dyed fibers around the cell cluster areas.



43-Picture. The elastic fibers (1) contained in the sequestrated hernia fragment were randomly stained with fuchselin.

Conclusion. During the initial period of dystrophic and degenerative changes in the structure of the intervertebral disc, pathological processes are observed in all morphofunctional parts of the disc. As a result, the fibrous ring bulges out of its area together with the fibrous ring, as a result of rupture of the fibrous ring, the fibrous ring tissue hangs out and becomes a pathological condition in the form of a hernia. Thus, the main changes in this process develop in the fibrous ring, that is, in it from the development of tumors, myxamatosis, dystrophy, destructive fibrous structures are destroyed, broken and ruptured. In addition, histogenic cells that develop the inflammatory process in the fibrous ring tissue grow and thin it further. The proliferation of lympho-histiocytic cells, characteristic of the inflammatory process, is not limited to the fibrous ring, but also spreads to the underlying connective tissue. These structures are then completely broken down, destroyed, converted to necrobiotic matter, and calcined.

Degenerative, ie dystrophic and destructive changes in hernia involve all structural elements of disc tissue, in the fibrous ring these changes are accompanied by an inflammatory process, resulting in necrobiosis, rupture and dehydration of fibrous structures, homogenization and necrosis of fibers, swelling and calcification of the interstitial nucleus. determined

The composition of the material removed during surgery for sequestrated hernia of the intervertebral disc; it was confirmed that a portion of the resilient nucleus falling into the sequestrated spinal canal, a portion of the resilient nucleus hanging outward in the ruptured area of the fibrous ring, two sides of the ruptured area of the fibrous ring, sometimes a portion of the posterior longitudinal ligament, a portion of the plate covering the disc below and above. Sequestrated resilient

core tissue was found to have a polymorphic structure, consisting of fragments that were destroyed, necrotic, and sometimes covered with inflammatory infiltrates and fibrous tissue. In most cases, the structure of the sequestrated nucleus was found to be necrotic, unstructured coarse detritus, which also developed calcinosis. It was found that the fibrous connective tissue in the fragments taken from the fibrous ring was almost completely destroyed, infiltrated by inflammatory cells and blood vessels, and sometimes the connective tissue was observed to grow and fibrosis.In sequestrated hernias, the resilient nucleus tissue has a polymorphic structure, covered with destructive, necrotic, inflammatory infiltrates and fibrous tissue, often turning into coarse detritus without necrotic structure, around which developed calcinous chondromatosis and ossification processes.

V - BOB. MORPHOMETRICAL INDICATORS OF SPINAL INTERMEDIATE DISK

There is another method used in morphological examinations, namely the method of morphometry, in which organs and tissues quantify various structural elements and disease-specific pathomorphological changes, and the results are important in assessing the developmental stages of pathological processes, quantitative changes in each structural element.

The results showed that in the control group, ie in the histological preparations prepared from the disc material of the intervertebral discs from the corpses of those who died of other diseases, the fibrous ring of the disc consisted mainly of collagen fibers, their area averaged 81.7 ± 1.7%. The disc tissue was found to contain an intermediate substance consisting of thin connective tissue and tissue fluid in the range of collagen fiber tufts, and its area occupied was on average 6.5 ± 1.1%. The cells, which constantly produce fibrous ring structural elements, are densely packed between the fibers and occupy an average area of 11.7 ± 1.4% of their area (see Table 21).

A similar histometric examination was performed on the resuscitative nucleus of the disc. The number of chondrocyte cells and their area was slightly less than twice the width of the fibrous ring in the vibrating nucleus, and averaged 16.7 ± 1.66%. It is natural that the pericellular space around the chondrocyte cells is filled with an intermediate substance, and its area occupied was on average 11.1 ± 0.68%. Collagen fibers in the nucleus accumbens were found to be 10% less than the fibrous ring and their area occupied was on average 72.2 ± 2.0%. Hence, it can be concluded that fibrous structures in the intervertebral disc components of the intervertebral disc were observed to be more dense and densely packed, while the cells were less densely packed and densely packed. In the vibrating nucleus, in

contrast, cells and intermediates were found to occupy twice as much space as the fibrous ring, and fibers occupied 10% less space (see Table 21).

Table 21.

Quantitative indicators of control group and protrusion of vertebral disc disc structural elements, in%

Groups	Objects	Tissue structural units, %		
		VCF	VCHC	VI
Control groups	Fibrous ring	81,7±1,7%	11,7±1,4%	6,5±1,1%
	Pulpous ring	72,2±2,0%	16,7±1,66%	11,1±0,68%
Protrusion	Fibrous ring	66,8±2,1%	12,9±1,49%	20,3±1,8%
	Pulpous ring	54,5±2,22%	18,3±1,73%	27,2±1,98%

Note: * - significant differences in the relative values of the groups before and after treatment (* - P <0.05; * * - P <0.001); Significant differences in the relative values of * - groups before and after treatment (^ - P <0.05; ^ ^ ^ - P <0.01. ^^^ - P <0.001);

In protrusion, morphometric examination of the disc material showed a strong tumor in the fibrous ring of the disc, the development of degeneration, the area occupied by the intermediate substance expands sharply and occupies twice as much space as the control group, averaging 20.3 ± 1.8%. In response, the reaction of the cells in the fibrous ring proceeds to proliferation, and the area occupied by them expands 1.5 times relative to the control group (see Table 5.1). As a result, the area of collagen fibers in the fibrous ring decreases by 15% compared to the control group (R≤0.05) due to the expansion of the areas occupied by the intermediate and cells in the ring. It is observed that the morphometric changes in the vibrating nucleus are even stronger. As the vibrating nucleus intermediate material underwent more intense swelling and degeneration as a result of protrusion, the area occupied by the intermediate material increased sharply, expanding 3 times relative to the control group (see Table 5.1). Due to such a strong change in the interstitial material of the nucleus accumbens, it is observed that the area occupied by the collagen fibers in it is significantly reduced, ie reduced by 20% compared to the control group (R≤0.05).

Histometric examination of the intervertebral disc herniated material showed that the area occupied by the structural elements present in the disc did not change dramatically, but also developed various pathomorphological changes in their composition.

The following morphometric changes were detected in the fibrous ring; the area occupied by collagen fibers decreased by 2 times compared to the control group, which serves as a quantitative indicator of the dystrophic and destructive changes of the fibers. Another pathological change specific to this disease was confirmed to be acute swelling and myxamatosis of the intermediate (see Table 5.2). As a result, the area occupied by the intermediate was found to be 4 times larger than the control group. In addition to these changes, the following pathomorphological changes, including inflammatory infiltrate, occurred in the fibrous ring of the disc under the influence of hernia, occupying an area of 10.3 ± 1.35%. The dystrophic and destructive changes that developed in the fibrous ring structure were manifested by necrobiosis of the tissue and its area occupied by an average of 6.1 ± 1.07%. These dystrophic and destructive processes often result in the deposition of calcium salts in necrotic tissue, and in our study the calcinosis foci accounted for 2.9 ± 0.75% of the fibrous ring.

The results of morphometric examination of the disc-containing resilient nucleus as a result of hernia disease were found to be even more significant. It was found that the area occupied by collagen fibers, which are part of the living nucleus, decreased sharply, occupying 2.5 times less space than the control group. These changes are reflected in the expansion of the area occupied by intermediates and chondrocytes. In this case, it is observed that the area occupied by the intermediate is 3 times wider than the control group. Inflammatory infiltrates, foci of necrosis, and areas occupied by calcinosis developed under the influence of hernia in the nucleus accumbens were found to be further enlarged ($R \leq 0.01$) (see Table 22).

Histometric examination of the sequestrated hernia material showed that strong quantitative changes were also observed with respect to protrusion and hernia data. Pathological changes in the fibrous ring, such as advanced inflammation, necrosis and calcinosis, are observed to occupy almost 40% of the tissue (see Table 22). Specifically, inflammatory infiltrates accounted for 20.7 ± 1.81% of fibrous ring tissue, necrosis foci -11.1 ± 1.4%, and calcinosis -6.5 ± 1.1 %%. As a result, it was found that the area occupied by the fibrous ring's own tissue structures, ie collagen fibers, was further reduced, occupying 3 times less space than the control group and 0.7 times less space than the hernia ($R \leq 0.01$).

Pathological changes in the structure of the living tissue structures of the nucleus were observed, occupying 43% of the total area (see Table 22). It was confirmed that the main pathological changes were the development of necrotic

lesions, which accounted for 28.9 ± 2.02% of the total area of the nucleus accumbens, which is 3 times more than for hernia. As a result, as a result of proliferation of chondrocytes in the nucleus accumbens, it was confirmed that their area expanded by 2 times compared to the control group, and 0.7 times compared to hernia. The saddest thing was that due to the infinite destruction of collagen fibers in the nucleus accumbens, their area was reduced to a minimum, ie only 15.1 ± 1.61%.

Table 22.

Quantitative indicators of pathomorphological changes in the structural elements of the intervertebral disc and its herniation, in%

Groups	Objects,n=10	Тўқима структур бирликлари, %			Патоморфологик ўзгаришлар, %		
		VCF	VCHC	VI	VII	VFON	VC
Control group	Fibrous ring,	81,7±1,7	11,7±1,4	6,5±1,1			
	Pulpous ring	72,2±2,0	16,7±1,66	11,1±0,68			
Hernia	Fibrous ring	42,6±2,21	14,4±1,57	23,8±1,9	10,3±1,35	6,1±1,07	2,9±0,75**
	Pulpous ring	31,5±2,67	15,3±1,6	28,8±2,02	9,4±1,3	8,9±1,27	6,1±1,07**
Sequestrated hernia	Fibrous ring	33,9±2,11	14,0±1,55	13,8±1,54	20,7±1,81	11,1±1,4	6,5±1,**1
	Pulpous ring	15,1±1,61	22,1±1,85	18,0±1,71	8,9±1,27	28,9±2,02	7,1±1,14**

Note: * - significant differences in the relative values of the groups before and after treatment (* - P <0.05; * * - P <0.001); Significant differences in the relative values of * - groups before and after treatment (^ - P <0.05; ^ ^ ^ - P <0.01. ^^^ - P <0.001);

As shown at the beginning of this chapter, on the basis of quantitative indicators of structural elements in the tissue, it is possible to determine the activity coefficients of tissue structures that perform specific functions in that tissue. In our study, we calculated the activity coefficients of collagen fibers and chondrocyte cells, which are the main elements in the fibrous ring of the intervertebral disc and the nucleus accumbens. Quantitative indicators of these tissue structures, especially activity coefficients, show in numbers how much their morphofunctional state has changed during protrusion, hernia, and sequestrated hernia. These coefficients in the control group were as follows: in the fibrous ring, the coefficient of collagen fiber activity (CFC) was 12.6, and the coefficient of chondrocyte activity (CFC) was 0.14. In the vibrating nucleus, KTFK was 6.5 and XFK was 0.23. In degenerative diseases of the disc, a sharp decrease in these coefficients was observed, and an increase in the index of HFC. If this condition is explained by the morphofunctional functions of these structural elements, in

degenerative diseases collagen fibers undergo degeneration and destruction, and their activity decreases. Chondrocytes become more active and proliferate in response to these diseases.

Clearly, fibrosis is present in protrusion; KTFK decreases by 4 times and XFK increases by 0.3 times. In the vibrating core; If KTFK decreases 3 times compared to the control group, XFK increases 1.5 times (see Table 5.3). In hernia, the collagen fiber activity coefficient of the fibrous ring is further reduced, with a 7-fold decrease in the control group and a 3-fold increase in HFC. In the vibrating nucleus, KTFK decreased by 6 times and XFK increased by 2 times. In sequestering hernia, these parameters were observed to change even more profoundly. In the fibrosis ring, KTFK was found to decrease to 2.45 and HFK to 0.41. In the vibrating nucleus, KTFK decreased to 0.83 and HFK to 1.46, ie 7 times higher than in the control group (see Table 23).

Table 23.

The coefficient of activity of the structural elements of the intervertebral disc fibrous ring and the nucleus accumbens

	Fibrous ring		Pulpous ring	
	Activity coefficient of collagen fiber	Chondrocytes activity coefficient	Activity coefficient of collagen fiber	Chondrocytes activity coefficient
Control group	**12,6**	**0,14**	**6,5**	**0,23**
Protrusion	3,2	0,19	2,0	0,34
Hernia	1,79	0,34	1,09	0,48
Sequestrated hernia	2,45	0,41	0,83	1,46

Conclusion. Based on the purpose of the study, histometric calculations of the areas occupied by the fibrous ring and fibrous nucleus tissue structures of the intervertebral disc showed that;

In the control group, it was confirmed that the fibrous ring tissue area consisted of 85% collagen fibers, 10% cells, and 5% intermediate material. In the vibrating nucleus, 70% of the tissue area was collagen fibers, 17% cells, and 13% intermediates.

In protrusion, the area of collagen fibers in the fibrous ring decreased by 15% compared to the control group, and the area of the intermediate substance increased by 15%. In the living nucleus, the area of collagen fibers decreased by 46.6%, the area of intermediates increased by 39%, and the area occupied by cells increased by 3.4%.

In hernia, the area of collagen fibers in the fibrous ring of the disc decreased by 42.5% compared to the control group, the area of the interstitial material increased by 20%, inflammatory infiltrate in fibrous ring tissue accounted for 10%, necrosis foci - 6%, calcinosis - 3%. .

In sequestering hernia, the area of collagen fibers in the fibrous ring was 33.9%, inflammatory infiltrate 20.7%, necrotic foci 11.1% and calcinosis 6.5%. In this disease, the area of collagen fibers in the living nucleus of the disc is reduced to a minimum of 15.1%, chondrocytes - 22.1%, intermediate - 18.0%, the rest of the area, ie inflammatory infiltrate - 8.9%, necrosis foci - 28, 9% and calcinosis were confirmed to be 7.1%.

In fibrosis ring in protrusion; KTFK decreases by 4 times and XFK increases by 0.3 times. In the vibrating core; If KTFK decreases 3 times compared to the control group, XFK increases 1.5 times.

In hernias, the CTFK of the fibrous ring is further reduced, with a 7-fold decrease in the control group and a 3-fold increase in the CFC. In the vibrating nucleus, KTFK decreased by 6 times and XFK increased by 2 times. In sequestering hernia, these parameters were observed to change even more profoundly. In the fibrosis ring, KTFK was found to decrease to 2.45 and HFK to 0.41. In the vibrating nucleus, KTFK decreased to 0.83, HFK to 1.46, ie 7 times higher than in the control group.

CHAPTER VI. CHOOSING A NEW APPROACH AND TREATMENT TACTICS FOR THE DIAGNOSIS OF INTERVERTIC DISK HERNES

In this monograph, which is devoted to the study of protrusion and hernia injuries belonging to the structural and functional types of degenerative diseases of the spine, the joint surface of the spine consists of a symphysis, a disc, a fibrous ring and a revolving nucleus. Our topographic and morphological study of the above parts of the spine has led to the choice of an effective method in the treatment of protrusion and hernia of the spine. The microscopic structure of the topographic and morphological position of the symphysis and spinal disc of the spine was studied. Spinal synchondroses are densely packed with a disc attached to the surfaces of the upper and lower joints. The inner surface of the fibrous disc is much thicker, and the fibrous surface, consisting of dense collagen fibers, is surrounded by a layer that is twice as thin as the relatively thick part. Topographic variability of the connective tissue in different parts of the connective tissue has been identified, which has been proven in its histological structure. It was found and scientifically illuminated that the fibrous fibrous layers in the dense dense surface layer of the fibrous disc are circular, the next inner layer is in the radial

direction, and the surface side of the vibrating nucleus is composed of irregular collagen fibers.

The fact that protrusions and hernias of the spine play an important role in diseases of the musculoskeletal system today requires the development of new modern methods of treatment of this disease. In the health care system of the Republic it is important to study the topographic, morphological, histological structure of protrusions and hernias of the spine, which leads to early and complete diagnosis of patients.

The spine is the basis of the locomotor system, which is one of the most important organs in human life activities. The lumbar disc of the spine works like a lubricated zulf in a human being. The vibrating core of the vertebral disc, on the other hand, creates softness, easing the loads on the spine and reducing stress levels. The development of protrusion and hernia of the spine in different occupations is considered to be an occupational disease. There are professionals who do not have the ability to completely eradicate this disease. In today's age of information and computer technology, the working conditions and activities of many professionals are leading to a decline in mobility.

In people's lifestyles, such low mobility and heavy loads in labor activities are leading to an increase in spinal diseases. As a result, the disease is manifested by the development of protrusion and hernia of the spine. In these diseases of the spine, the fibrous ring of the symphysis is damaged and the state of elasticity is disrupted, leading to the development of protrusion and hernia in the disc.

Due to the complexity of the vertebral column, the diversity of its structure and location requires the development of a treatment algorithm. This will require a thorough analysis of the morphological topography and histological structure of the vertebral disc. In the studied data, there is no circulatory system in the topography of the vertebral column, which indicates that it is fed from the lateral tissues in a diffuse manner.

As we noted above, there are occupations in which inactivity leads to degenerative changes in the fibrous ring, resulting in protrusion of the spine, followed by hernia. In this case, the change in the elasticity of the structure of the spinal disc after shocks and various loads leads to rupture of the fibrous ring after thinning. In patients, the spinal disc becomes deformed if the load begins to increase. In the process that occurs, the tissue of the resilient nucleus moves out of place, and the inner surface of the fibrous ring becomes tightly connected, damaging it.

As a result of the above loads, over time, the disc becomes dehydrated and malnourished, which means that the resilient core tissue does not return to its original position. Failure of the connective disc tissue to return to its original position results in damage to the inner layer of fibrous tissue, an exacerbation of

which can lead to disc protrusion. The spinal disc causes a significant enlargement of the disc as a result of deformation of the fibrous tissue, which leads to constriction of the nerve endings, reflex and muscular tonic syndromes of the members of that area.

When the spinal hernia is pronounced based on the topography and morphology of t he lumbar disc, it is distinguished by the thinness of the side facing the spinal nerve roots. The thinness of this surface leads to nerve damage and complications. The disc herniation is classified and diagnosed according to the direction of its exit and its size. Diagnosis and treatment based on the pathomorphology and topography of the vertebral disc in the treatment of protrusion and hernia of the spine will play an important role in improving the quality of life of people in the future. The materials obtained at the autopsy were studied separately in people aged 30 to 50 years and from 50 to 65 years. In this case, our age-specific study was useful in the detection of congenital disc pathologies.

Another reason we study age-related protrusion and hernia of the spine is in line with the priorities of scientific research. Increased disc load in patients with aging leads to a violation of the normal morphological condition as a result of factors that cause hormonal changes and degenerative pathologies in tissues. As a result of these processes, various pathomorphological changes occur in the vertebral disc.

The constant study of the morphology of the protrusion and hernia of the spine requires our scientific analysis of pathomorphological processes. Based on these studies, it can be said that the creation of pathomorphological bases of protrusions and hernias of the spine serves as a scientific basis for the restoration of human health.

Thus, our conclusion based on the morphology of spinal protrusion and hernia determines the treatment algorithm. Although the nucleus accumbens in a hernia can contract or spontaneously absorb, especially if it is sequestered, an increase in nerve damage accompanies this process. Therefore, a comprehensive assessment of clinical manifestations and other symptoms is important. The main physiopathological mechanism of nerve compression syndrome is the inhibition of blood flow in these venous vessels. The process of venous occlusion associated with compression of nerve roots causes capillary stagnation.

Treatment is mainly conservative and operative, including rest regimens, medications, physiotherapy (distraction drawings), weight loss, and surgical procedures. treatment alleviated symptoms.Relevant treatment modalities are selected based on the results of a comprehensive assessment of clinical symptoms and the degree of stenosis. In the acute phase of the disease, a 21-day bed rest regime is recommended, which helps to reduce muscle tone and lower the pressure

on the intervertebral disc. During this period, it is advisable to use corsets that fix the spine. Patients need to learn mobility skills in their daily lives, for example:
-correct posture, regular changes in body position throughout the day.
- In the period of exacerbation and remission of the disease is recommended to engage in therapeutic distraction, gymnastics
In the complex treatment of joint-nerve and disc-nerve conflict syndromes present in the spinal canal, the treatment of the spine by the method of distraction is part of a modern complex of treatment measures. Schemes for determining the time and mode of traction in traction treatment of the spine with the help of various special devices have been developed and proposed. The creation and methods of these devices were aimed at eliminating the factors that cause acquired hyperlordosis, kyphoscoliosis, caudal migration in patients. These pathologies are the factors that cause the development and complications of disc protrusion and hernia. treatment was achieved, and in 15% of patients endoscopic and traditional methods were performed (see Fig. 44).

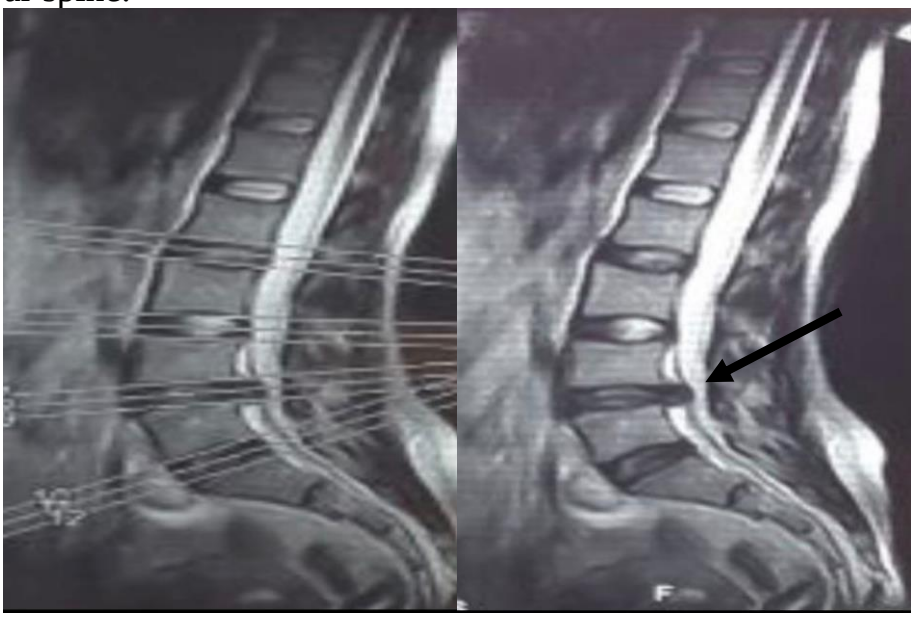
Instructions for operation:

Constant compression of the spinal roots, inadequate results of conservative treatment;

Acute myeloradiculoischemia syndrome, ineffectiveness of conservative treatment for 21 consecutive days;

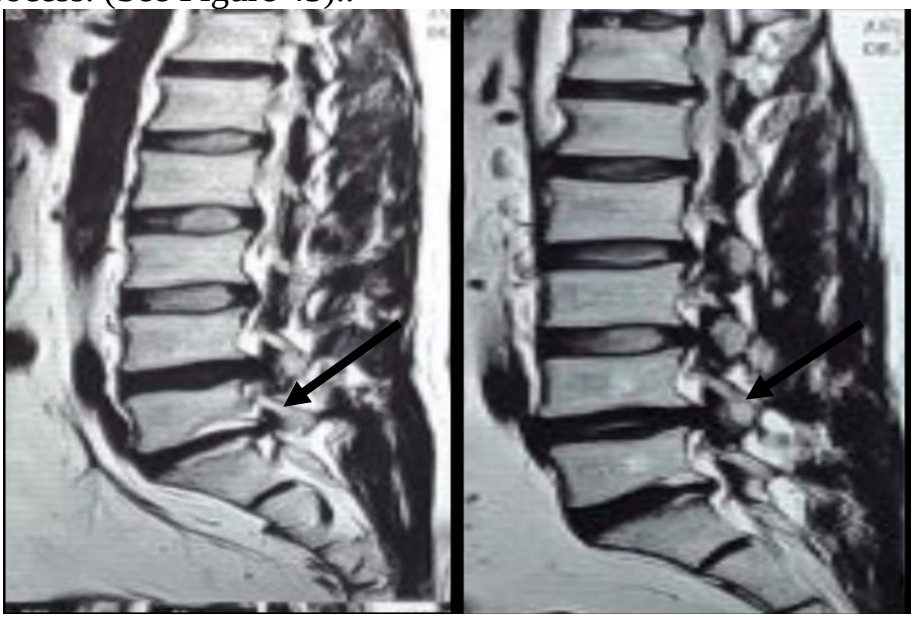
exacerbation of myoneurological insufficiency syndrome and ineffectiveness of conservative treatment;

a sharp increase in pain during physical activity, a sharp limitation of the function of the lumbar spine.



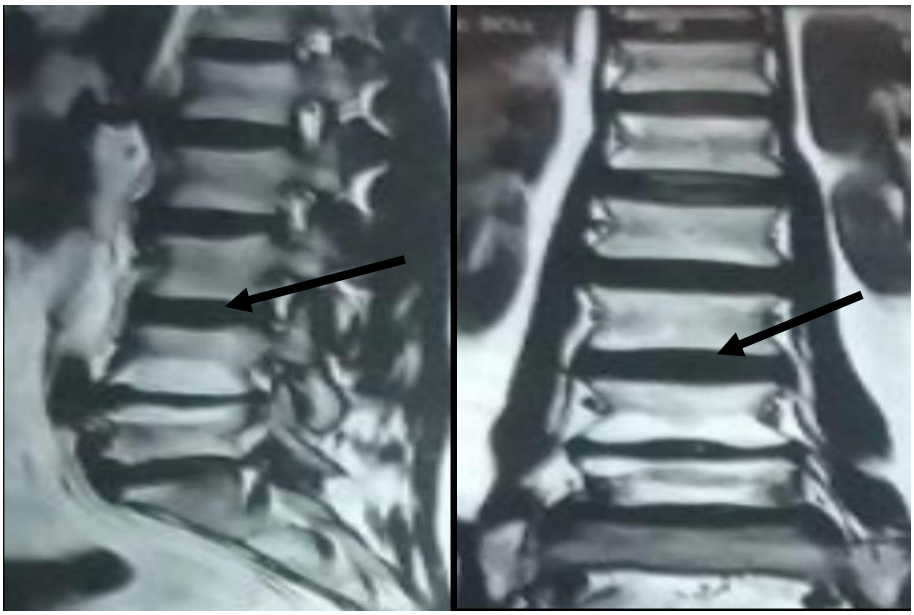
44- Figure lumbar spine VL4-5 disc herniation in the picture.

Because patients of this type typically have degeneration, protrusion, hyperplasia, and stenosis in many segments, it has been proven that the pathomorphological section and location of the disc should be determined prior to surgery for clinical signs. A new approach to pathomorphological diagnostic practice will certainly help in this. Proper diagnosis, even during surgery, can alleviate symptoms of highly limited decompression; Thus, extensive resection of the disc should be avoided to prevent squeezing of the spinal canal, only resection of the area shown by the image. Because this type of hernia is difficult, severe stenosis of the nerve root canal and nerve compression result. Thus, the tissue that causes compression should be carefully removed. Distinguishing a sequestrated hernia from a traumatic hernia gives good results because the traumatic types do not need surgery because they are restored. - Do not cut, as this will cause the recovery process. (See Figure 45)..



45-Figure VL4-5 and VL5-VS1 postoperative condition of disc herniation

Disc fragments should be completely surgically removed, especially sequestered fragments (including rare fragments that have entered the subarachnoid space); their location can be determined by clinical manifestations and pathomorphological processes based on MRI results. To reduce the likelihood of recurrence, the fibrous ring should be removed loosely after the fragments inside the disc have been removed from the resilient core. However, resection of uncut normal disc tissue should not be performed, as excessive resection of disc tissue exacerbates injury, jeopardizes stability, and increases the incidence of spondyloarthritis or even dysthymia. (See Figure 6-3)



46-Picture. Figure VL4-5 identified spondyloarthritis and dysthymia.

In surgical practice, disc clamps or neuron-crushing and electrode surgical instruments exacerbate nerve damage if they are forcibly lowered into the stenosis zone. Minor invasive decompression surgeries of nerve structures are advisable to prevent exacerbation of nerve injury; for example, the back wall of the channel can be removed using a high-speed burr. In minimized invasive endoscopic surgery in the type of destructive hernia, good results can be achieved by complete removal of fragments or sequestrated substances

Conclusion. When we analyze the clinical and pathomorphological changes in the protrusion and hernia of the spine, the disc is developing differently in all vertebrae, which requires an accurate assessment of pathological processes. The results of the research showed that in the study of the degree of disease of patients and the correct diagnosis, pathomorphological changes should be identified with an individual approach to age, lifestyle and activity. Diseases of the spine occupy a high place among the diseases of the musculoskeletal system, the main reasons for which are the relevance of the monograph. An increase in the incidence of spinal protrusion and hernia is due to an increase in functional living conditions in people over the next 10 years, i.e., a decrease in the required level of mobility and inactivity in the elderly. All this leads to the development of diseases that impair the activity of the spinal cord, ie nutrition. Congenital disc protrusion and hernia is a disease of people living in modern conditions and requires the development of modern treatment methods and an individual approach.

The treatment of protrusion and hernia of the spine should be based on the clinical morphological findings of the spinal disc, which requires an individual

approach to each patient and the diagnosis and treatment based on it. We found that the clinical morphological changes of the vertebral disc we studied were different at different stages of the spine, and that the pathomorphology was abnormal as a result of these stresses. And at the same time we found that aging leads to irreversible pathological changes of the disc.

The practical significance of the results of the study is explained by the development of a procedure for diagnosing pathomorphological changes aimed at preventing diffuse malnutrition of the collagen fibers of the intervertebral disc fibrous ring of the intervertebral disc in the case of protrusion and hernia of the intervertebral disc with degenerative changes.

The fibrous ring around the vertebral column and the nucleus accumbens are the main source of tension in the movement. The thinning of the collagen fibers towards the fibrous surface, and the double thinness of the outer posterior side, the fact that the fibrous tufts are located in a circle in the outer dense layer of the ridge gives.

Studies have shown that spinal disc herniation in people aged 30 to 65 years should be treated based on microscopic examination of the above pathomorphological processes. One of the most important factors in human health is a healthy lifestyle. All this requires a thorough study of the disease. The conclusion is that the right tactics in the diagnosis and treatment of patients are the basis for human health. can be one of the recommendations.

The results of all studies revealed the need to clearly identify pathomorphological changes in spinal protrusion and hernia, depending on the localization of the process, and thus to develop a treatment algorithm. A thorough study of the clinical morphological features of spinal protrusion and hernia leads to the identification of the causes of the disease, the correct analysis and the correct choice of treatment algorithm for clinicians. Thus, it became clear that the need for accurate assessment of clinical morphological changes of ankle disc protrusion and hernias. Through this, perfect diagnosis and treatment in modern ways play an important role in human health.

END

The human body performs the functions of body movement, posture, body structural integrity, and the transmission of sensory and autonomic nervous system messages from the brain to all organs and tissues through the spinal cord. This basic system of the body has a complex structure, and the intervertebral disc adapts the spine and spinal cord to complex biomechanical laws. Therefore, osteochondrosis and disc pathologies of parts of the spine are a common disease, leading to impairment of the above functions. [3; 59-67-b., 6; Pp. 20-25, 11; 36-

41-b., 12; 6-16-b., 18; Pp. 19-22,], Dystrophic and degenerative diseases of the spine are one of the important problems in medicine. Their development depends on the lifestyle of the human body, on the one hand, and malnutrition of the spine, on the other hand, on the lack of fluid, oxygen, nutrients, vitamins and minerals. comes (6, review). The disease can occur between the ages of 20 and 60 years. After the age of 60, disc tissue loses almost all of its water content, becomes fibrous dense tissue, resulting in calcification of the ligaments, blockage of the intervertebral space, slowing of movement. [50-51-p., 56; 168-b., 101; 267-279-p., 104; 1674-1684-b.] Although data on intervertebral disc degenerative diseases are available in the scientific literature, there is insufficient information on the morphogenesis of pathomorphological changes that develop in the disc component, the extent to which changes pass from one to another, and their morphological manifestations. In particular, at the onset of degenerative disc disease, it is necessary to determine what morphological changes underlie this functional process, which is why the fibrous ring decreases its ability to diffuse fluid and nutrients. [25; 496-b., 30; P. 408] There is no doubt that the composition of the residual nucleus of the disc is high in the role of proteolycans in the intermediate. There is a lack of data on what causes the development of dystrophic changes in this substance at the onset of degenerative diseases, what changes in their morphological basis. Degenerative diseases develop more in which area of the disc, in most cases one side of the fibrous ring becomes thinner, ruptured and causes a hernia, there is almost no data on what its morphological changes are. So, in this work, we have managed to find a solution to the urgent tasks mentioned above, which are to improve the important information that is still lacking in the literature.

The main goal of this monograph was to improve the data on the morphogenesis, morphological and morphometric features of protrusion, hernia and sequestrated hernias, which are degenerative diseases of the intervertebral disc. Several specific tasks were selected according to purpose.

Necessary materials and methods were selected to achieve the goal, a total of 89 spinal disc fragments removed during surgery in patients with protrusion and hernia of the spine were taken as material. As a control group, a spinal disc was isolated from the corpses of those who died from 16 other diseases. The disc fragments were hardened in a phosphate buffer solution of 10% formalin, paraffin bricks were prepared, histological incisions were made and stained with hematoxylin-eosin for general morphology, the morphofunctional state of the connective tissue fibers in the disc was examined by picrofuxin van-Gizon method, and the elastic fibers were examined by Fuxelin. Morphometric examination of the structural units of the intervertebral disc component G.G. Avtandilov's (1984) method of "counting points".

We modified this method by copying it to a computer screen, that is, taking 10 images from different areas of histological specimens prepared for each group of material under study, and placing a grid of 200 cells on a computer monitor according to these images. we listed depending on. Since the points of the lattice mesh placed on the tissue cross-section were at the same distance, the coincidence of the tissue structures without selection ensured that this method conformed to the law of relativity. The area of all structural units was taken as Vv, i.e. 100%, the area of each of the structural units to be calculated was determined by naming these structures, e.g. From Vkt (collagen fibers), Vxh (chondrocyte cells), Vom (intermediate) and pathological changes; Vyai (inflammatory infiltrate), Vno (foci of necrosis), Vk (calcinosis). Based on mathematical formulas, the arithmetic mean (M), absolute error (m), and reliability level (R) of each indicator were calculated. The following coefficients can be calculated on the basis of quantitative data obtained on these indicators; 1) the ratio of the ratio of collagen fibers of the fibrous ring to the area of the intermediate substance - the coefficient of activity of collagen fibers (KTFK);

2) the ratio of the area occupied by chondrocytes in the fibrous ring and the nucleus accumbens to the area of collagen fibers - the coefficient of activity of chondrocytes (CFC);

As a result of the study, the analysis of clinical and laboratory data of patients was initially studied from referrals to pathohistology and medical history of patients treated in the departments of traumatology and neurosurgery. The main group of patients was analyzed by age and sex. The incidence of various forms of spinal degenerative diseases was almost the same, depending on the sex of the patient. and kidney disease, kidney, liver, and lung disease in the middle-aged, UIC, and hypertension in the elderly predominated. In women, general obesity in young people, obesity in middle age, endocrine diseases, and cardiovascular disease in the elderly took the main place.

Instructions for surgical removal of spinal hernia and their detection rate in percentage were obtained as follows; 1) severe and persistent pain under the influence of drugs in 94.7%, 2) enlargement of the areas of anemia and paresthesia - in 56.8%, 3) enlargement of the central paralytic area in the legs and arms - in 67.4%, 4) local inflammatory symptoms occurrence - development of perifocal epiduritis, sequestration into the spinal canal - was detected in 72.8%. Three of these clinical signs were observed in 62.6% of cases, and 2 in 85.4%. From these indicators, it can be concluded that the presence of symptoms 1, 2 and 3, based on the surgical treatment of spinal hernia, is an absolute indicator, especially if their combination further increases the level of indication. The following types of disc protrusion and their incidence were identified: anterior-lateral type - 23.4%, posterior-lateral type - 68.5% and circular shape - 8.1%. Hence, in our material, it

is observed that the back-side type is more common than spinal hernias. Of these types of hernias, the posterior-lateral form is the most dangerous, and according to our material, it has been confirmed that this form is more surgically removed.

The results of morphological studies showed that in the initial period of dystrophic and degenerative changes in the structure of the intervertebral disc in protrusion, pathological processes were observed simultaneously developing in all morphofunctional parts of the disc. But the degree of development of pathological processes varies. Pathomorphological changes, such as more prominent edema, myxamatosis, and fibrous rupture, are observed to develop in the outer fibrous ring. The elastic fibers in it violate their normal position and appear in the form of dark blue structures of different orientations and different thicknesses. In the cell layer below it, these changes lead to the development of edema and myxomatosis, as a result of which chondrocytes also suffer from dystrophy and necrobiosis. In the vibrating nucleus, on the other hand, it is observed that the collagen fibrous tufts change their direction and become slightly fragmented, the amount of elastic fibers decreases, and they remain only around the cells. The essence of these pathomorphological changes is that secondary destruction of the surrounding fibrous structures occurs due to the occurrence of protein and carbohydrate dystrophy of mucopolysaccharides such as proteollican in the interstitial substance of the disc.

Thus, degenerative changes in protrusion begin suddenly and at different levels in all morphofunctional parts, edema, myxamatosis and fibrous dystrophy predominate in the fibrous ring, while in the resilient nucleus collagen fiber tufts change direction from interstitial tumor, a decrease in elastic fiber content was confirmed.

The dystrophic and degenerative changes that develop in the intervertebral disc continue chronically and eventually cover almost all tissue structures. If destructive changes develop strongly in the outer fibrous ring, it leads to its thinning, fragmentation of fibrous structures and loss of base function. As a result, the fibrous ring bulges out of its area along with the fibrous ring, and as a result of the rupture of the fibrous ring, the fibrous ring tissue bulges out and hangs out, becoming a pathological condition in the form of a hernia. Thus, the main changes in this process develop in the fibrous ring, that is, in it from the development of tumors, myxamatosis, dystrophy, destructive fibrous structures are destroyed, broken and ruptured. In addition, histogenic cells that develop the inflammatory process in the fibrous ring tissue grow and thin it further. The proliferation of lympho-histiocytic cells, which is characteristic of the inflammatory process, is not limited to the fibrous ring, but also spreads to the underlying connective tissue, where it also develops destructive and inflammatory processes. In parallel with these pathomorphological changes, destructive changes also develop in the living

nucleus, ie it is initially dehydrated and turns into a coarse protein with homogenized protein structures. These structures are then completely broken down, destroyed, converted to necrobiotic matter, and calcined. Degenerative, i.e. dystrophic and destructive changes in hernia include all structural elements of disc tissue. In the fibrous ring, necrobiosis, rupture, and dehydration of the fibrous structures, homogenization and necrosis of the fibers, and swelling and calcification of the interstitial nucleus have been reported.

The material removed during surgery for sequestration of the intervertebral disc contains a portion of the residual nucleus sequestrated and falling into the spinal canal, a portion of the resilient nucleus hanging out of the ruptured area of the fibrous ring, two sides of the ruptured area of the fibrous ring, sometimes part of the posterior longitudinal ligament. it was confirmed that part of the ridge plate covering the bottom and top was removed.

It should be noted that in the diagnosis of a sequestered hernia, we proved that the fibrous ring should be removed without cutting, but in the process, the fibrous ring can be restored. and fibrosis was found to consist of fragments covered with tissue. In most cases, the structure of the sequestrated nucleus was found to be necrotic, unstructured coarse detritus, which also developed calcinosis. It was found that the fibrous connective tissue in the fragments taken from the fibrous ring was almost completely destroyed, infiltrated by inflammatory cells and blood vessels, and sometimes the connective tissue was observed to grow and fibrosis.

In sequestrated hernia, it was observed that the living nucleus tissue has a polymorphic structure, covered with destructive, necrotic, inflammatory infiltrate and fibrous tissue, in most cases turned into coarse detritus without necrotic structure, around which developed calcinous chondromatosis and ossification processes.

It is known that the analysis of the appearance and microscopic level of organs and pathological changes that develop in organs and tissues as a result of various diseases gives qualitative results and is important data in assessing the morphological basis of pathological processes. There is another method used in morphological examinations, namely the method of morphometry, in which organs and tissues quantify various structural elements and disease-specific pathomorphological changes. The results are of great importance in assessing the stages of development of pathological processes, quantitative changes in each structural element.

Morphometric studies showed that fibrous structures in the fibrous ring were more dense and densely packed, while the cells were less densely packed and densely packed. In the living nucleus, in contrast, cells and intermediates were found to occupy twice as much space as the fibrous ring, and fibers occupied 10%

less space. In protrusion, the area occupied by collagen fibers in the fibrous ring was reduced by 15% compared to the control group, and the intermediate substance was expanded by 4 times. Similar changes were detected in the vibrating nucleus.

In hernia, the area of collagen fibers in the fibrous ring component was reduced by 2 times compared to the control group, and the intermediate substance was reduced by 4 times, ie by 23.8%. In addition to these changes, pathological changes in the structure of the fibrous ring were observed in hernia, of which inflammatory infiltrate - 10.3%, necrosis - 6.1%, calcinosis - 2.9%.

Significant changes also develop in the structure of the vibrating nucleus. The area occupied by collagen fibers decreased 2.3-fold compared to the control group, and the interstitial space expanded 2.6-fold. Pathological changes occupied the following areas; inflammatory infiltrate - 9.4%, foci of necrosis - 8.9%, calcinosis -6.1%.

Sequestrated hernias are characterized by the development of strong changes in both the fibrous ring and the resilient nucleus component. The area of collagen fibers in the fibrous ring decreased by 2.4 times compared to the control group, the area occupied by inflammatory infiltrates was 20.7%, foci of necrosis - 11.1%, foci of calcinosis - 6.5%.In the living nucleus, even stronger changes were observed, ie the area occupied by collagen fibers was reduced to a minimum compared to the control group, ie 4.8 times, chondrocytes 0.75 times, the intermediate expanded 2 times, due to pathological changes; inflammatory infiltrate was found to be 8.9%, necrosis foci the highest at 28.9%, and calcinosis foci at 7.1%.

Based on the quantitative indicators of the structural elements in the tissue, the coefficients of activity of tissue structures that perform specific functions in this tissue were calculated. In our study, we calculated the activity coefficients of collagen fibers and chondrocyte cells, which are the main elements in the fibrous ring of the intervertebral disc and the nucleus accumbens. These activity coefficients were quantified quantitatively to show how much the morphofunctional state of tissue structures, including protrusion, hernia, and sequestrated hernia, had changed. These coefficients in the control group are as follows; in the fibrous ring, the collagen fiber activity coefficient (CFC) was 12.6, the chondrocyte activity coefficient (CFC) was 0.14, and in the resilient nucleus the CFC was 6.5 and the FCC was 0.23 (see Figure 8). In degenerative diseases of the disc, a sharp decrease in these coefficients was observed, and an increase in the index of HFC. If this condition is explained by the morphofunctional functions of these structural elements, in degenerative diseases collagen fibers undergo degeneration and destruction, and their activity decreases.

Clearly, the coefficient of collagen fiber activity in the fibrous ring is 12.6 in the norm, 3.3 in protrusion, 1.79 in hernia, and 2.45 in sequestered hernia. The

coefficient of activity of fibrous ring cells increases: in the control group - 0.14, in protrusion - 0.19, in hernia - 0.34, in sequestered hernia - up to 0.41. The coefficient of activity of collagen fibers in the vibrating nucleus was 2 times lower than in the fibrous ring, ie 6.5, which decreased to 2.0 in protrusion, 1.09 in hernia, and 0.83 in sequestered hernia. It was confirmed that the coefficient of activity of vibrating nuclear chondrocytes changed as follows: in the control group - 0.23, protrusion - 0.34, hernia - 0.48, and in sequestrated hernia - 1.46.

CONCLUSIONS

The following conclusions were made as a result of research on the monograph "Pathomorphological diagnosis and treatment of intervertebral disc herniation";

1. The existence of areas of the spinal disc consisting of subtle and functional changes in the structural structure of the vertebral disc, leading to the development of hernias;
2. Pathological changes of degenerative changes in the protrusion of the first stage of development of intervertebral disc herniation have a flat and different onset in all morphofunctional parts;
3. Degenerative, ie dystrophic and destructive changes in hernia involve all structural elements of disc tissue, in the fibrous ring these changes are accompanied by an inflammatory process, resulting in necrobiosis, rupture and dehydration of fibrous structures, homogenization and necrosis of fibers, swelling and calcification of the interstitial nucleus. was found to be bulging.
4. In sequestrated hernia, it was observed that the resilient nucleus tissue has a polymorphic structure, covered with destructive, necrotic, inflammatory infiltrate and fibrous tissue, in most cases the necrosis becomes a rough detritus without structure, calcification chondromatosis and ossification processes develop.
5. In the control group, 85% of the fibrous ring tissue area consisted of collagen fibers, 10% of cells and 5% of intermediates, and 70% of collagen fibers, 17% of cells and 13% of intermediates in the residual nucleus. In protrusion, hernia, and sequestrated hernias, the area occupied by collagen fibers in both the fibrous ring and the resilient nucleus decreased, the interstitial area expanded, and inflammatory infiltrates, necrosis, and calcification foci appeared in the sequestrated hernia.

These changes serve as a fundamental basis in the detection, diagnosis, and treatment of degenerative and dystrophic diseases of the spine.

PRACTICAL RECOMMENDATIONS

1. Analysis of morphological changes to identify each pathology in the vertebral disc leads to the elimination of pathologies in the development of the normative criterion of the disc.
2. In the algorithm of negative evaluation of morphological changes, the increase in the order of numbers is consistent with the development of dystrophic and degenerative processes in the abnormality of histotopographic disc injury, the development of protrusion, hernia and sequestral hernias of the disc.
3. Normal diffuse nutrition of the intervertebral disc plays an important role in assessing the functional activity of the intervertebral disc and the development of degenerative changes in protrusions and hernias.
4. This monograph, written as a result of studying the pathomorphological symptoms of the intervertebral disc of the spine as a result of various irregular and constant loads of the musculoskeletal system, is the most optimal effective criterion for a new approach to the treatment and diagnosis of hernias.

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