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НОВЫЙ ДЕНЬ В МЕДИЦИНЕ
NEW DAY IN MEDICINE**

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IMPROVEMENT OF A METHOD FOR DETERMINING MORPHOLOGICAL CHANGES IN SPINE SCHMORL HERNIAS SIZE

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✓ Resume

This scientific article presents information on the morphogenesis and specific morphological changes of single and multiple Schmorl's hernias developing in one or more locations of the spine. Schmorl's hernia, or herniation of the intervertebral disc, is a herniation of the intervertebral disc that ruptures into the vertebral body, the intervertebral disc. It is caused because of the rapid growth of the body during the youth of the human body, the soft tissue of the spine grows rapidly, the bone tissue lags behind the growth, a tear appears in the spongy part of the bone. The membrane covering the articular surface of the spine may eventually develop a dip in the spongy part of the bone. In place of the spongy cells, a cavity forms in the cancellous bone into which cartilage, connective tissue, and calcified substance ingrow.

Keywords: Schmorl's hernia, vertebral hernia, morphological changes, calcinosis.

УСОВЕРШЕНСТВОВАНИЕ МЕТОДА ОПРЕДЕЛЕНИЯ МОРФОЛОГИЧЕСКИХ ИЗМЕНЕНИЙ РАЗМЕРА ГРЫЖ ШМОРЛ ПОЗВОНОЧНИКА

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✓ Резюме

В данной научной статье представлены сведения о морфогенезе и характерных морфологических изменениях одиночных и множественных грыж Шморля, развивающихся в одном или нескольких местах позвоночника. Грыжа Шморля, или грыжа межпозвоночного диска, представляет собой грыжу межпозвоночного диска, прорывающуюся в тело позвонка, межпозвоночный диск. Причина ее в том, что из-за быстрого роста организма в период молодости человеческого организма мягкие ткани позвоночника быстро растут, костная ткань отстает от роста, в губчатой части кости появляется разрыв. Мембрана, покрывающая суставную поверхность позвоночника, со временем может развиться в результате погружения в губчатую часть кости. На месте губчатых клеток в губчатой кости образуется полость, в которую врастают хрящ, соединительная ткань и кальцинированное вещество.

Ключевые слова: грыжа Шморля, позвоночная грыжа, морфологические изменения, кальциноз.

УМУРТҚА ПОҒОНАСИ ШМОРЛ ЧУРРАСИНИ МОРФОЛОГИК ЎЗГАРИШЛАРИНИ АНИҚЛАШ УСУЛИНИ ТАКОМИЛЛАШТИРИШ

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✓ Резюме

Ушбу илмий мақолада умуртқа погонаси бир ва бир-нечта жойида ривожланадиган якка ва кўп сонли Шморл чуррасининг морфогенези ва хос морфологик ўзгаришлари ҳақида маълумотлар келтирилган. Шморл чурра ёки тоғайли туғун умуртқа суяги танасига, яъни ўртасидаги галвирак қисмига ёриб кирадиган тоғайли чурра ҳисобланади. Унинг сабаби инсоннинг ёшлик даврида тананинг тез ўсиши сабабли умуртқа погонасининг юмшоқ тўқималари тез ўсиб, суяк тўқималари ўсишдан орқада қолиши ва суякнинг галвирак қисмида бўшлиқ пайдо бўлиши, умуртқа суяги бўғим юзасини қоплаб турувчи парда вақт ўтиши билан суякнинг галвирак қисмига ботиб киришидан ривожланади турлари ҳам учраши мумкин. Галвирак суяк таркибидаги кўмик хужайралар ўрнида бўшлиқ пайдо бўлиб, унга тоғай, бириктирувчи тўқима ва кальцинозли модда ўсиб киради.

Ключевые слова : Шморл чурра, умуртқа погонаси, морфологик ўзгаришлар, кальциноз

Relevance

A Schmorl's hernia, or Schmorl's node, was first described by the German scientist Georg Schmorl in 1927. The difference from horizontal hernias of the spine is that the herniated tissue penetrates the vertebral body, that is, the middle part of the spinal column. It is caused by the fact that due to the rapid growth of the human body during the adolescent period, the soft tissues of the spine grow rapidly, the bone tissue lags behind the growth, and a tear appears in the spongy part of the bone. Schmorl's hernia is usually located in the thoracic and lumbar spine. Clinical complications are rare and can manifest themselves in the form of paralysis. Several types of Schmorl's hernia are distinguished depending on the localisation and the number of nodes formed [3, 4].

The intracorporeal type is the most common, and the spongy spine is damaged. There is also an intravertebral type, which occurs due to displacement of the elastic sheath of the spine. There can also be single and multiple types, developing in one or more places in the spine. The pathomorphological changes that occur in the spine and surrounding soft tissues before and after the development of a Schmorl's hernia are poorly understood.

The main objective of this scientific study was to investigate the pathomorphological changes occurring in the whole part of the vertebral column, the peripheral dense bone of the body, the middle part of the cartilage, the elastic sheath covering the joint surface, and the fibrous sheath of the vertebral disc.

A Schmorl's hernia can be caused by a number of factors that prevent the vertebral bones and intervertebral disc from hardening. It is often caused by disproportionate development of the bony regions of the spine, bone development lags behind, a cavity appears within it and bone substance sinks into it (9, 10). Weight loss, microtrauma, weight lifting and diving can also cause osteoporosis of the spine. In the elderly, osteoporosis of the bones, including the spine, leads to degenerative-dystrophic spinal diseases. Intestinal diseases, including chronic enteritis and enterocolitis, develop when intestinal absorption of calcium is impaired or when calcium is released from the body in large amounts in hyperparathyroidism.

Clinically, because the nerve bundles exiting the spine are not damaged, no inflammation develops in the spinal structures, and spinal function is not impaired, this condition is latent. When a Schmorl's hernia occurs, movement and flexibility of the spine are limited. Spondyloarthrosis often develops due to restricted movement, the severity is due to spinal tumours. Sometimes there is curvature of the spine. As a result of jumping from a height, a compression injury to the spine develops and a herniated disc occurs.

When determining a Schmorl's hernia, it is necessary to take into account the absence of causes that bother a person, while taking into account the presence of microtraumas of the spine during the examination, the performance of exercises on jumping from heights. Of course, the patient should be examined by a neurologist or vertebrologist. If the radiograph reveals a Schmorl's hernia and there is an additional symptom of pain in the spine, this confirms that the hernia has developed between the vertebrae.

Aim of research

The material of this scientific study was surgical interventions performed in the neurosurgical department of the ASMI clinic during 2019-2022, that is, discectomy, laminectomy, Schmorl's hernia

material in the vertebral body, sacral body and its filled referral. as the object of study.

Materials and methods

To achieve the goal set before us, 26 boys underwent surgery for Schmorl's hernia in the spine, its elastic sheath, peripheral dense and middle spongy parts of the brow bone, as well as herniated tissue of the dyad were taken as an object. studies and examined by histological and histochemical methods. As the material of the present scientific research during surgical interventions performed in the neurosurgical hospital of Andijan city emergency department, namely: discectomy, laminectomy (specify the name of the operation), the fibrous membrane of the intervertebral disc, elastic membrane covering the vertebral column is removed. The marginal dense and medial portions of the pubic bone, Schmorl's hernia with sunken fibre were removed. These tissue sections were fixed in 10% formalin with phosphate buffer for 72 hours. The bony part of the fragments was decalcified in 10% nitric acid. Then all pieces were washed in running water for 3-4 hours, dehydrated in alcohols of increasing concentration, embedded in paraffin with wax and blocks were prepared. Histological sections 5-7 μm thick were prepared from paraffin blocks and stained with hematoxylin-eosin and Van-Gieson method. The preparations were examined under a light microscope and photographs were taken of the necessary areas.

Result and discussions

Considering the mechanism of Schmorl's hernia, first the cancellous part of the vertebral bone, then the elastic sheath covering the articular surface and the fibrous sheath of the vertebral disc, and then the herniated tissue embedded in the cancellous part of the bone. were studied microscopically (Fig. 1). Taking into account the peculiarities of the processes, such as the mechanism of development of pathomorphological changes in these tissues, dystrophic, destructive and necrobiotic changes of tissue structures, during surgical treatment of this disease.

Spinal cord. Given the damage to the spongy part of the spinal cord in Schmorl's hernia, we first studied the pathomorphological changes that develop in this bone. The spongy part of the bone histologically represents a spongy (Latin: -substantia spongiosa) structure, with continuous bone columns located between the pores. Compared to compact bone columns, the spongy part occupies a lot of space, gives the bone lightness, low density and strength, and is bone-spongy. The spongy part of this bone has a structure similar to the epiphysis of tubular bones. Compact bone columns are irregularly spaced, which gives the bone strength and durability.

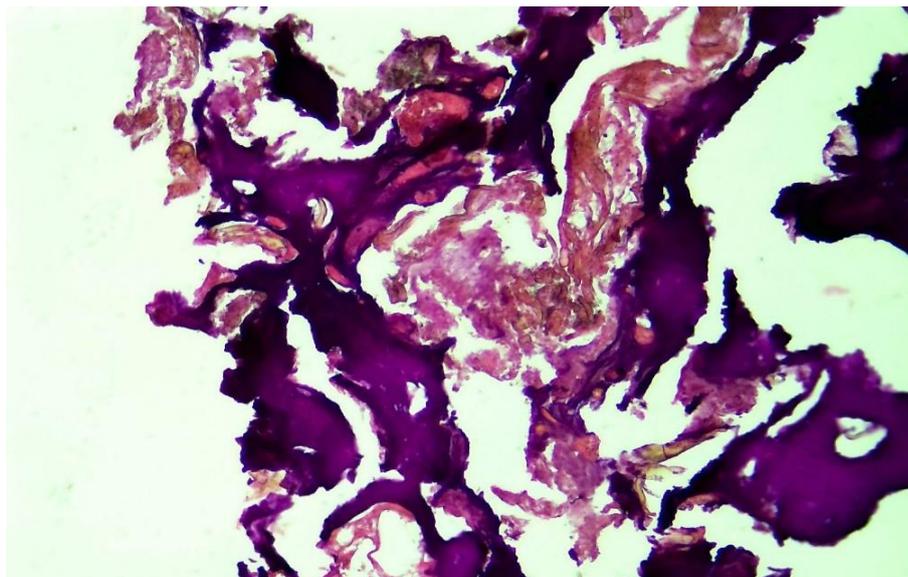


Figure 1: Schmorl's hernia. The spongy part of the vertebral column is destroyed, there are haemorrhages in the pore spaces, and sclerosis develops. Stain: V-G. Size: 10x10.

Individuals with Schmorl's hernia develop a number of common pathomorphological changes in the spine, including severe and irreversible dystrophic and destructive changes in compact bone columns (Fig. 2). Dystrophic changes are observed with the formation of fibrous dysplasia and foci of calcinosis in the bone columns. As a result, it is found that the bone columns have lost their histotopography and have shifted to an unstructured state. It is observed that compact bone is stained incorrectly with hematoxylin-eosin dyes, hematoxylin foci predominate in most places. It is known that calcium salts accumulate a lot and calcinosis has developed in areas that have been hit by large amounts of haematoxylin dye in the bone tissue. When examining the vertebral spine, it was found that the pore spaces of the bones were filled with bone marrow cells, instead they were filled with thrombi, carbohydrate and protein matter, bundles of connective tissue and foci of calcinosis. In some cases fibrous and lipomatous dysplasia is detected in the cancellous part of the bone. It is determined that compact bone columns are additionally deformed, broken in some places, fibrous tissue has grown. Instead of normal bone marrow in the pore spaces of the bone, overgrown and proliferating fibrous connective tissue bundles and adipose tissue are detected (Fig. 2). Microscopic examination of the compact columns of the spongy part of the vertebral bone revealed that protein-collagen fibres in the bone structure decreased, and due to the increase in calcified substances, it darkened with haematoxylin dye. It was found that a layer of haematoxylin appeared, especially in the outer parts of the bone. Small and large vacuoles are ubiquitous in the compact bone (Fig. 3).

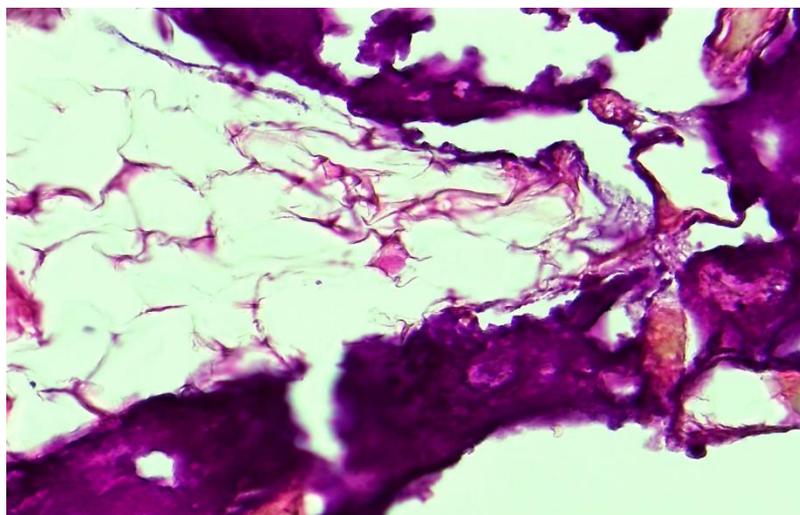


Figure 2. Schmorl's hernia. Appearance of fibrosis and lipomatous tissue in the bone pores. Stain: V-G. Size: 10x40.

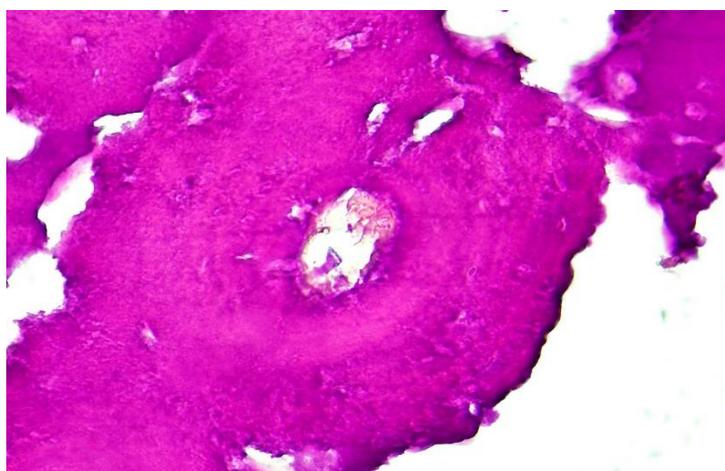


Figure 3. Schmorl's hernia. Formation of foci of calcinosis and vacuoles in compact columns. Stain: V-G. Size: 10x40.

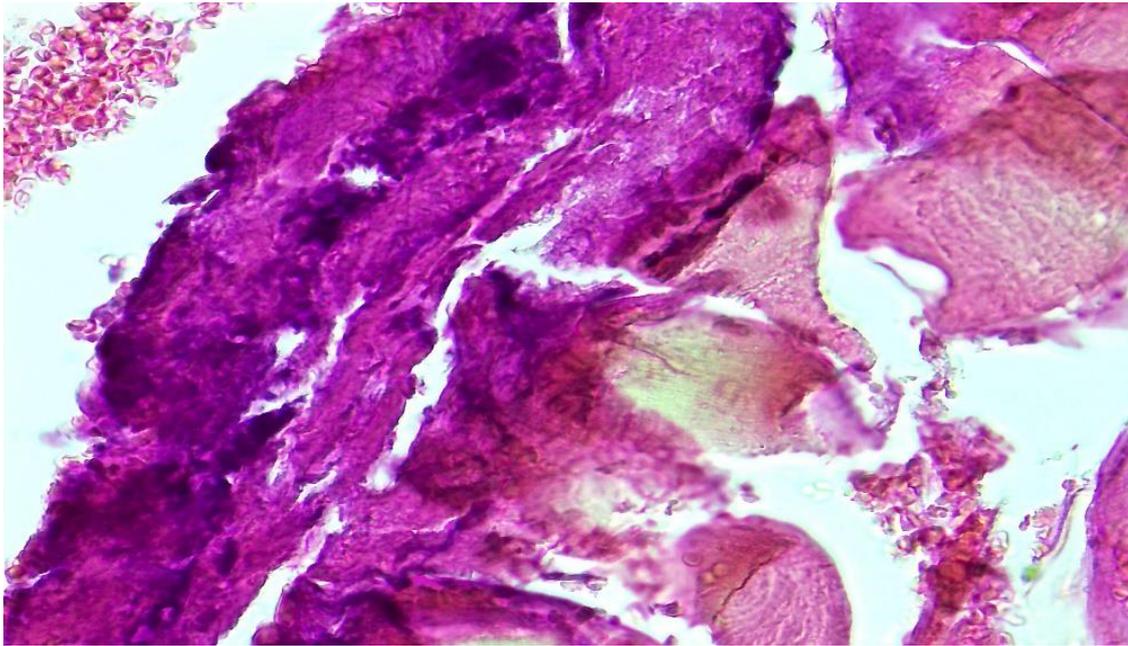


Figure 4. Schmorl's hernia. Development of elastic membrane, dystrophy, calcinosis and destruction. Stain: V-G. Size: 10x40.

In Schmorl's hernia, the elastic fibrous sheath covering the spongy part of the spine on the vertebral disc side was microscopically studied and the following pathomorphological changes were established. Due to the development of dystrophic, calcinotic and destructive changes in the structure of the elastic sheath, it is found to be histologically chaotic and stained to varying degrees. It is noted that the fibrous structures of the drape are fragmented and destroyed, arranged chaotically, and tears appear in some places. It is established that the surface of the sheath attached to the bone has separated, a gap has been formed between them, the process of calcinosis with multiple and large foci has developed in the structure of the sheath. When the elastic fibres in the elastic bandage were stained using the Weigert method, it was found that the elastic fibres in all areas of the bandage decreased in number, disintegrated, lost elasticity and turned into a coarsely dispersed substance in a homogeneous state. (Figure 4). It was noticed that an irregularly arranged layer of elastic fibres of relatively dark colour appeared on the outer surface of the fabric. In the inner part of the membrane, vacuolised foci of various sizes are found among the torn elastic fibres.

In Schmorl's hernia, when a cavity appears in the spongy part of the spine, the fibrous sheath stretches and expands due to increased pressure by the contents of the spinal disc, its fibrous structures thin and rupture, and the elastic fibrous sheath beneath it also expands under pressure, breaks its elasticity, as a result of which it also cracks, and the spongy material sinks into the cancellous bone. Morphologically, it is found that the structure of the herniated disc has changed, it has ruptured the fibrous sheath, and the cancellous bone has penetrated through the ruptured elastic fibrous sheath. As a result, compact columns of cancellous bone crack and break, and penetration of cancellous tissue into porous spaces is determined. When this process develops, microscopic examination of the fibrous sheath of a herniated disc reveals the following changes: fibrous structures in the fibrous sheath are thinned, thinning due to edema, most of them have disintegrated, homogenised, substance with coarse composition has appeared.

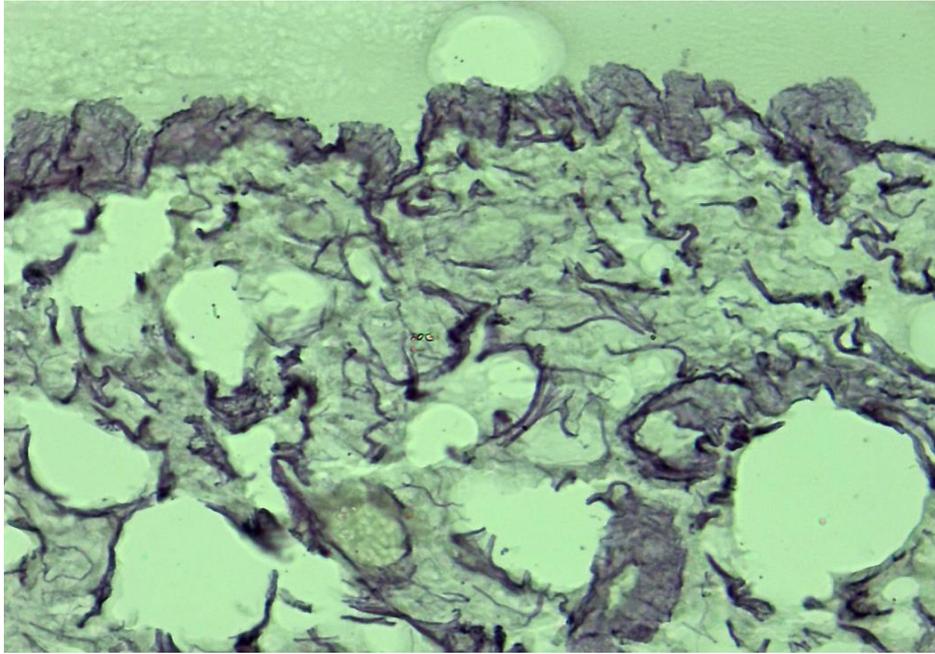


Figure 5. Schmorl's hernia. Breakdown and destruction of elastic fibers in the elastic membrane. Stain: Weigert method. Size: 10x40.

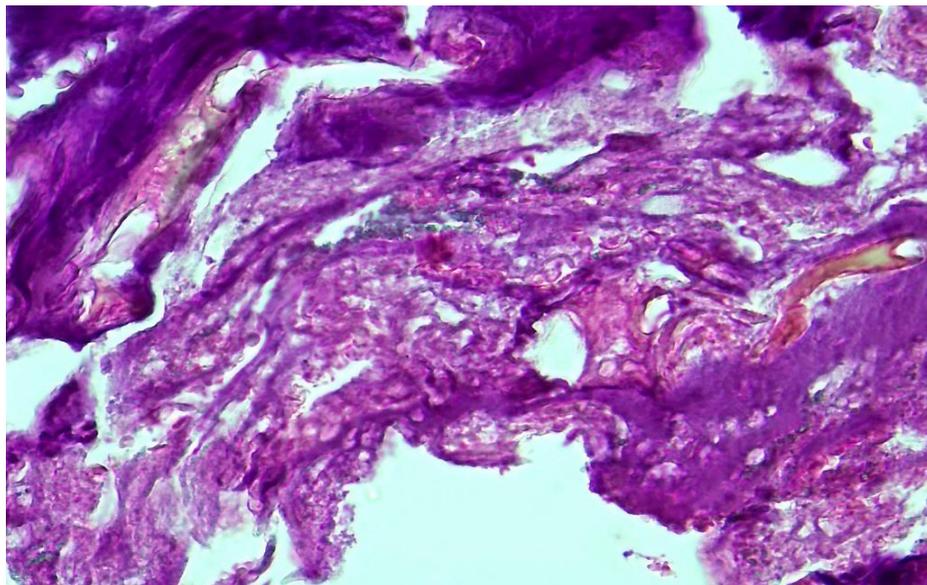


Figure 6: Schmorl's hernia. The composition of the spongy tissue embedded in the cancellous bone is fragmented, destroyed by spongy-fibrous tissue and calcinosis. Stain: V-G. Size: 10x40.

In Schmorl's hernia, microscopic examination of the spongy tissue embedded in the cancellous bone determines that the spongy substance is destroyed, fragmented, dystrophic and calcified (Fig. 6). Foci of haemorrhages, fibrous structures are identified among them. It is noted that fibrous bundles of fibrous tissue are present along with the thick tissue, they are also destroyed and fragmented.

Conclusions

1. The cause of a Schmorl's hernia is that the soft tissues of the spine develop rapidly as a result of the body's rapid growth at a young age, the bone tissue lags behind and a tear appears in the cancellous part of the bone. , and the membrane covering the articular surface of the spine eventually descends into the cancellous part of the bone.

2. It was found that severe and irreversible dystrophic and destructive changes developed in the compact bone columns of the vertebral column, fibrous dysplasia and calcinosis appeared, and the bone columns lost their histotopography and became structureless.
3. Instead of normal bone marrow cells, thrombi, carbohydrate-protein substance, bundles of connective tissue and calcinosis, and in some cases complete lipomatosis are found in cystic bone pores.
4. It is observed that in the elastic-fibrous sheath covering the cancellous bone, elastic fibres are destroyed and homogenised, coarse protein is formed, interstitial substance is vacuolated and disintegrated.

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