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Surgical Treatment of Patients with Degenerative-Distrophic Diseases of the Spine Conducting Additional Testing Methods

Karimov Komiljon Kamolovich

Bukhara State Medical Institute named after Abu Ali Ibn Sino, Bukhara, Uzbekistan

Abstract In this article, the causes of recurrent pain syndromes are progressive disc degeneration and herniation recurrence, the development of epidural adhesions in the spinal canal with the outcome of extensive fibrosis of the epidural space, the appearance of a hernia at an adjacent level and instability of the spinal-motor segment. Therefore, the issues of diagnosis and treatment of surgical and non-surgical forms of osteochondrosis of the lumbar spine are not only of great medical, but also of high social importance. By now, thanks to the work of a large number of domestic and foreign scientists, a certain clarity has been achieved in the study of the etiopathogenesis of osteochondrosis of the spine. The variety of emerging pathomorphological and pathophysiological situations determines the clinical polymorphism of the disease.

Keywords Surgical treatment of patients with degenerative-dystrophic diseases of the lumbar spine

1. Introduction

Multifactorial disease, both with hereditary components and acquired static-dynamic, autoimmune, metabolic and other disorders. Intervertebral disc osteochondrosis is a widespread disease that is clinically manifested in one in four employees. In recent decades, there has been a significant increase in the incidence, while in 75% of patients, the lumbar spine is involved in the degenerative-dystrophic process. Every fifth person in the world over the age of 30 suffers from discogenic sciatica. Reflex and compression syndromes are distinguished in the clinical picture of osteochondrosis of the lumbar spine. Surgical treatment is mainly required for compression forms of osteochondrosis of the spine. Most radicular and myotonic syndromes of lumbar osteochondrosis are based on compression of the nerve structures located in the spinal canal. The most common cause of such effects is a herniated disc. Herniated discs are the most severe form of lumbar osteochondrosis.

According to various authors, the failure rate ranges from 10% to 90%. All this has led to the fact that over the past few decades, doctors have focused their efforts on finding new minimally invasive techniques that can reduce potential complications. The theory of degenerative-dystrophic lesions of intervertebral discs is based on research. Now this name is the most common, as it very fully reflects the pathological processes developing in the intervertebral disc and the anatomical formations surrounding it.

Some anatomical features of the lumbar spine should be clarified. The spinal canal at this level should be divided into three functionally significant sections.

1. The central section (the canal of the dural sac) is bounded in front by the posterior surface of the vertebral bodies and discs, from the sides by the legs of the arches, from the back by the arches of the vertebrae connected by yellow ligaments and the posterior intervertebral joints.
2. The radicular canal is the space where the root passes from the dorsal sac to the exit from the intervertebral foramen. The canal is bounded from the outside by the pedicle of the overlying vertebra, from the inside by the dural sac, from the front by the vertebral body, from the disc and from behind by articular masses.
3. The intervertebral foramen, the exit point of the root, is limited by the lower edge of the pedicle of the underlying vertebra and the upper articular process of the underlying vertebra.

Spinal canal can change due to a number of reasons, such as osteophytosis, hypertrophy of the musculoskeletal system, osteoarthritis and arthritis. The causes of narrowing of the canal may also be spondylolisthesis and congenital stenosis. In the diagnosis of compression and non-compression forms of osteochondrosis of the lumbar spine, a thorough neurological and orthopedic examination is of no small importance. The accumulated experience makes it possible in most cases to abandon such non-topically accurate diagnoses as sciatica or

* Corresponding author:
karimov.komiljon@bsmi.uz (Karimov Komiljon Kamolovich)
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sciatica, since it is almost always possible to differentiate the nerve roots involved in the process as a result of damage to the intervertebral discs. Neurological diagnosis in such cases helps to establish the level of the affected disc, facilitates the choice of diagnostic measures and is often crucial in determining the indications for a particular treatment method. When choosing the optimal surgical treatment tactics, the concept of the degree of narrowing of the spinal canal and the mechanism of compression of nerve structures is crucial. In the diagnosis of osteochondrosis of the lumbar spine, both contrast and contrast-free research methods are widely used, with varying degrees of reliability, having both positive qualities and disadvantages.

Diagnostic value of these methods ranges from 50 to 89%. Overview spondylography is one of the most common diagnostic methods for lumbar osteochondrosis. The theory of intervertebral disc degeneration, etiology and pathogenesis of spinal osteochondrosis were developed based on the use of discography. As a contrast method, discography is still the method of choice in the examination of patients with discoradicular conflicts, especially in the absence of the possibility of computed tomography (CT) and magnetic resonance imaging (MRI). In essence, it is a nucleography performed by injecting a contrast agent into the pulpous nucleus of the disc. Discograms can provide the necessary information about the condition of the disc under study, which is crucial when choosing treatment tactics. Myelography, in the presence of good visualization, has an insufficiently demonstrative state of the nerve roots. With the introduction of CT research into clinical practice, it became possible to combine two diagnostic methods - CT and CT myelography, which made it possible to improve the visualization of the study area. With the introduction of computer and magnetic resonance imaging into practice, the reliability of information has increased to 82-95%.

Advantages and complement each other in choosing an adequate treatment method. The relationship of the hernia to the dural sac, spinal cord, and extra-temporal portions of the roots, along with the size of the disc fragments that have fallen out, determine the qualitative and quantitative characteristics of compression syndromes. There are four most typical localization of herniated prolapses: the median (median) hernia is located in the middle of the anterior (ventral) surface of the spinal canal, the paramedian (circumflex) hernia is also located on the anterior surface of the spinal canal, but it is slightly shifted to the right or left to the exit point of the extradural portion of the roots from the dura mater, and the lateral (lateral) hernia it is located at the entrance to the intervertebral foramen, the foraminal hernia is located directly in the intervertebral foramen.

These data allow for CT and MRI scans. In addition, CT and MRI make it possible to determine the exact size of the hernia and its location in the sagittal plane (cranio-caudal displacement), which is important for choosing treatment tactics and outcomes. At first glance, such tactics based on decompression of the contents of the spinal canal by laminectomy are pathogenetic, since the most important pathogenetic factor (herniated disc) is eliminated, and, therefore, the result of treatment should always be positive. However, based on the experience of many researchers, this position is only partially true. The authors report that only 25% of patients recover in the long term after laminectomy surgery for lumbar disc herniations, 58.3% of patients are disabled in groups II and III, and 16.7% of patients are forced to change jobs after surgery. In search of the reasons for the unsatisfactory results of disc herniation operations, many researchers have drawn attention to the fact that after laminectomy, patients experience insufficiency of the posterior supporting structures of the spine, which leads to the development of pathological mobility in its segments - instability. Some authors suggest the following as the most optimal treatment regimen. For operations at one or two levels and single-sided symptoms of root compression, interlaminectomy or hemylaminectomy can be used.

Symptoms of compression of neurovascular formations and at several levels, bilateral hemylaminectomy can be performed with preservation of the spinous processes and the interosseous ligament, excision of the hypertrophied yellow ligament, osteophytes. Parallel foraminotomy is advisable. In some cases, it may be necessary to use stabilizing metal structures. Sometimes it is advisable to divide the operation into two stages. At the first stage, decompression of the most affected spinal cord roots is performed (removal of a herniated lumbar intervertebral disc), and intensive vasoactive and neurostimulating therapy is performed. And, if no improvement and relief of the patient's condition has been achieved, a second stage of surgery can be proposed - a broader decompression (bilateral hemylaminectomy) with the creation of additional reserve spaces. [1,3,5,7,9,11,13,15,16].

Discectomy is used in a number of large domestic and foreign clinics. The method has been improved clinically, special equipment and tools have been developed to minimize the time of surgery and its traumatism. A new direction is endoprosthetics after anterior-access disc resection surgery. In the 1970s, there were reports of the use of endoprostheses to replace a pathologically altered intervertebral disc from the anterior and posterolateral approaches. Ceramic, carbon-containing and other implants were used for this purpose, but these developments were not widely used due to technical complexity, long-term rehabilitation and high cost. Proponents of anterior discectomy cite the following advantages of these operations: the radical removal of the pathological focus, the reliability of stabilization of the spinal segment, which is achieved by maintaining the height of the arthrodesis segment and straightening the lordosis. In the second half of the last century (especially in recent years), there was a tendency to reduce the volume of surgical intervention in the treatment of radicular syndrome. This trend was expressed in three directions: chemonucleolysis and dereception of the intervertebral disc, microsurgical discectomy and percutaneous discectomy.

Development of intervertebral disc fibrosis makes it possible to limit the range of movements in the operated spinal-motor segment, while not excluding the minimum

amount of movement that does not lead to local overload of adjacent spinal—motor segments. The process of disc reconstruction after chemonucleolysis is long and takes 1.5-2 years, which can lead to the development of a relapse of the disease, which sometimes requires surgical treatment with traditional methods. The method of chemical surgery is relatively simple and the results of its application in our country and abroad (USA) are positive in 80-93% of cases. The only obstacle to the expansion of its use were concomitant complications - allergic reactions and spondylodiscitis.

Chemical agents for local necrosis of the pulpous nucleus of the intervertebral disc has a number of disadvantages: poorly controlled depth of destruction, which does not exclude the development of disease recurrence, the possibility of allergic reactions and complications associated with damage to nearby important structures of the spinal canal, the duration of fibrosis formation. Dissatisfaction with the results of surgical interventions forces neurosurgeons to turn again and again to the problems of improving surgical techniques, introducing visual monitoring tools for the completeness and quality of the primary surgical aid performed. Thus, the time spent by patients in the clinic after laminectomy and hemylaminectomy averaged 25 days, the introduction of microsurgical discectomy reduced this period to 8 days. This postoperative period is due to the fact that, according to the authors, patients should stay in the clinic until the sutures are removed to avoid immediate postoperative complications (suture divergence, suppuration of the postoperative wound, etc.). In foreign clinics, patients operated on by discectomy are discharged on the second or third day after surgery. Microsurgical discectomy is contraindicated in patients with spinal canal stenosis, which causes neurological deficits, with a combination of herniated disc and spinal arachnoiditis, with unstable spondylolisthesis, and with general contraindications to surgical treatment. The use of transligamentous access and microsurgical techniques surpasses classical methods in their effectiveness, however, even with the use of these techniques, from 6.2% to 15% of patients need to undergo repeated surgery due to disc herniation and insufficient decompression of the contents of the spinal canal [2,4,6,8,10,12,14,16]. The lack of full visual control at the most critical stages of decompression often leads to rough and prolonged traction of the dural sac and roots, damage to the epidural veins, and incomplete removal of subcutaneously located migrated sequesters.

Reports of video endoscopy being used during open microsurgery. This method makes it possible to visualize the topographic and anatomical relationships of a herniated intervertebral disc, dural sac, spinal cord roots and their vessels before and after discectomy; it helps to choose an adequate method for removing a herniated disc, preserves the integrity of the epidural vessels, assesses the completeness and quality of curettage, as well as the effectiveness of hemostasis in the disc cavity during nucleation.- Ospreys. Further development of percutaneous nucleotomy is associated with the technical modernization of the instrumentation. As a result of the joint work of biomechanics specialists, fundamentally new endoscopic dilators have appeared, allowing them to push the surrounding tissues apart rather than cutting a hole in them. Modern instruments for percutaneous intervertebral disc surgery are based on this principle. Analyzing our own experience in the treatment of discogenic lumbosacral radiculitis, the following indications for percutaneous endoscopic nucleotomy are distinguished: young people with a relatively short history of the disease, lumbar syndrome, signs of discogenic radiculopathy with moderate motor deficiency, the presence of protrusion or a subligmented hernia without disruption of the integrity of the posterior longitudinal ligament, with a hernia size of no more than 8 mm without caudal and cranial displacement.

2. Conclusions

Severe motor disorders, the presence of a hernia of more than the sagittal size of the spinal canal, displacement of the hernia caudally or cranially, concomitant spinal canal stenosis, spondylolisthesis, previous operations at the same level. In the last 5 years, reports by foreign authors have indicated a violation of the stability of the spinal segment after microsurgical discectomy and puncture decompression of the disc. To eliminate instability after discectomy, it was proposed to implant one or two screw endoprostheses in the intervertebral space. Since the conclusions about instability after microdiscectomy and puncture decompression contradicted the observations of most researchers, this technique has not been widely used.

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