



Comparison of the Effective Dose of a Patient during Microsurgical Endoscopic Lumbar Discectomy

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Abstract: Lower back pain is one of the most common complaints of patients. In this case, the pain can be either isolated or accompanied by irradiation to the lower extremities. In 10% of cases, the cause of pain is a herniated disc. Currently, there is a constant increase in the number of these patients in different age groups, including at the expense of young patients. Improving the quality and availability of magnetic resonance imaging (MRI) had a great impact on understanding the frequency and nature of intervertebral disc damage. Most degeneration of intervertebral discs are asymptomatic, which makes it difficult to diagnose them, and hence prevent them at early stages. This leads to late appeals, aggravation of the stage of the disease, and therefore complicates conservative treatment. At the same time, it should be noted that conservative therapy in many cases, although it provides regression of the main symptoms of the disease, does not eliminate the cause of their appearance, which leads to frequent relapses and indications for surgical treatment. The methods of surgical treatment of this pathology are quite diverse. From volumetric and traumatic open techniques to minimally invasive endoscopic operations.

Continuous improvement of equipment and techniques of minimally invasive interventions allows minimizing soft tissue injury when accessing a damaged intervertebral disc and removing herniated protrusion. In turn, this leads to a reduction in the period of inpatient treatment [1.3.5.7.9.11.13]. With such an approach to the treatment of herniated intervertebral discs, the risk of infectious complications decreases, intraoperative blood loss decreases, soft tissue traumatization accelerates the process of rehabilitation and restoration of working capacity in working people. The choice of surgical treatment method is determined by the clinical picture of the disease, the data of the performed studies, the professional skills of the surgeon, the equipment of the clinic, the personal characteristics of each patient. To date, there is no consensus on which methods of treatment and prevention of intervertebral hernia of the lumbosacral spine are most effective, an individual approach to patients is recommended. One of such methods of treatment is endoscopic transforaminal removal of herniated intervertebral disc. The peculiarity of this method is the use of lateral transforaminal access through the intervertebral foramen, while the nerve root is visualized only after hernia removal. With such access, there is no need for root traction and good endoscopic visualization is provided, which favorably affects the results of the treatment. Endoscopic surgery is usually performed on an outpatient or inpatient basis and can be performed under local or general anesthesia.

Preserving the structural integrity and innervation of the parotid muscles, as well as reducing the number of epidural scars, facilitate early postoperative movements. This approach improves functional results and increases patient satisfaction with the result obtained. These factors, combined with a reduction in the duration of surgical intervention and the optional need for anesthesia, lead to

a reduction in the patient's stay in the hospital, which affects the quality of care provided. Recurrences of radicular syndrome after removal of herniated intervertebral discs of the lumbosacral spine, according to various authors, range from 6% to 15% of operated patients.

Recurrent herniation of the intervertebral disc of the lumbosacral spine is the most common indication for repeated surgery after lumbar discectomy. The frequency of relapses and the frequency of repeated operations with a herniated disc of the lumbar spine after microendoscopic discectomy reaches 10.8%. "Thus, the overwhelming majority of specialists engaged in percutaneous endoscopic surgery of the lumbar spine, notes its advantage over open minimally invasive approaches in a number of significant parameters such as the volume of intraoperative blood loss, the duration of the operation, the patient's hospital stay and the duration of the rehabilitation period. However, the results of assessing the severity of postoperative pain syndrome, the outcomes of surgery according to MacNab criteria, the frequency of complications, relapses and repeated operations require further study" [2.4.6.8.10.12.14].

The purpose of the study. The results of endoscopic treatment of patients with intervertebral hernias of the lumbosacral spine.

The application of the technique developed by us for transforaminal endoscopy with sequential puncture nucleoplasty for lumbosacral intervertebral hernias allowed us to expand the indications for this minimally invasive intervention, which in most cases helped to avoid more traumatic open hernia removal through large incisions and to avoid relapses in the subsequent medium-term period.

Under experimental conditions, the maximum absorbed skin dose of the patient and the effective dose of the surgeon's radiation load when performing percutaneous video endoscopic aids on the spine were determined for the first time. The dose coefficients of the transition from the exposure indicator for this type of operation to the values of the effective dose of the operator and the maximum absorbed skin dose of the patient are calculated. For the first time, within the framework of one study, a comparative analysis of the clinical efficacy of percutaneous video endoscopic discectomy, microdiscectomy, total arthroplasty and posterior single-level metallosteosynthesis in recurrent hernias of lumbar intervertebral discs was carried out. The expediency of using intervertebral disc prosthetics in case of herniation recurrence after endoscopic or microsurgical lumbar discectomy has been proved. The risk factors for recurrent herniated discs that were not previously described in the literature were determined, which made it possible to develop new algorithms for providing medical care with differentiated use of percutaneous endoscopic technologies. For the first time, the possibility and effectiveness of percutaneous endoscopic operations for degenerative instability of the vertebral-motor segment, pathological vertebral fractures and gunshot blind penetrating wounds of the spine were evaluated.

Results:

- to determine, based on the data of scanning examination methods, and, subsequently, to carry out the most optimal percutaneous endoscopic access to the surgical target localized in the spinal canal of the lumbar region;
- to reduce the degree of surgical invasion of decompressive aids in compression lumbosacral radiculopathy;
- minimize the radiation load on the patient and medical staff when performing percutaneous operations to remove herniated lumbar intervertebral discs;
- reduce direct and indirect economic costs for surgical treatment of patients with discogenic lumbosialgia;
- to reduce the frequency of recurrence of herniated discs after lumbar discectomy;
- Expand the range of surgical options for patients with diseases and spinal injuries.

The structure and organization of the work were determined by the purpose of the study aimed at improving the results of surgical treatment of degenerative-dystrophic diseases of the spine. The methodology was based on the principles and approaches of scientific cognition of research objects

within the framework of medical science, and included the analysis of scientific literature on the research topic, the construction of hypotheses, the formulation of tasks, the development of research design, the collection and processing of scientific material, the development of algorithms for the diagnosis and treatment of patients with vertebrogenic pain syndromes.

Modern percutaneous video endoscopic spine surgery involves the use of various puncture accesses to the spinal canal and intervertebral disc, the trajectory of which is planned at the preoperative stage by means of modern neuroimaging methods and applied computer programs that take into account the individual topographic and anatomical characteristics of the surgical intervention area, the size and localization of the surgical substrate. Percutaneous video endoscopic lumbar discectomy is a safe and effective method of treating patients with discogenic lumboishialgia, leads to a decrease in the degree of surgical invasion, provides a more favorable course of the postoperative period, helps to reduce direct and indirect economic costs. Taking into account the risk factors for the recurrence of herniated lumbar intervertebral discs allows you to determine the prognosis of lumbar discectomy, and choose the most rational tactics of surgical treatment. Total prosthetics of the intervertebral disc with a dynamic implant, in certain cases, may be a choice in the treatment of patients with recurrent hernias of the lumbar intervertebral discs, as a more effective method in comparison with other decompressive and stabilizing aids.

The appearance of a percutaneous single-portal endoscopic technique in the treatment of intervertebral hernias of the lumbar spine became possible after the appearance and improvement of transforaminal and interlaminar approaches.

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