

Optimize Surgical Treatments for Intervertebral Disc Herniation

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Relevance problems. Degenerative spinal diseases are extremely common among the adult population. Recently, the number of people seeking primary care for lower back pain has increased several times and has come out on top, leaving behind cardiovascular and bronchopulmonary pathology (Konovalov N.A., 2009; de Schepper E. I. T., 2016, Rahyussalim A. J., 2020; Al Ateeq M. et al., 2020). One of the most common forms of degenerative spine changes in adults and the elderly is degenerative stenosis of the lumbar spine (Antipko L.E., 2002; Asyutin D.S., 2014; Krutko A.V., 2015; Matz P. G. et al., 2016; Jensen R. K. et al., 2020). This pathology is accompanied by a progressive syndrome of neurogenic intermittent claudication, gradually disabling patients in the absence of timely care (Baskov A.V., 2011; Grin A. A., 2019). Degenerative stenosis is a regular aging process of the spinal motor segment, in the pathogenesis of which segmental instability plays an important role (Kirkaldy-Willis W. H., 1985; Byvaltsev V.A., 2015; Mlyavykh S. G., 2019). According to European authors, the incidence of symptomatic stenoses requiring surgical treatment increases with age from the level of 1.7-2.2% (40-49 years) to 10.3-11.2% at the age of 70-79 years (Kalichman L., 2009). In some cases, this condition is complicated by the formation of degenerative spondylolisthesis, which is found with a frequency of 19.1% to 43.1% among patients over 65 years of age. In 75% of cases, the displacement of the overlying vertebra does not exceed grade I according to Meyerding (Wang Y. X. J. et al., 2017; de Schepper E. I. T., 2016; Kalichman L., 2009; Denard P. J., 2010; Jacobsen S., 2007;).

Lumbar spinal stenosis ranks first in terms of the number of spinal surgeries in patients over 45 years of age (Adogwa O., 2013; Wu A.M., 2017). In the early stages, in the absence of severe neurological prolapses, these patients are shown conservative treatment (Soriano E., 2020). However, its effect is short-lived, and the number of positive results does not exceed 44% -69% (Sidhu GS et al., 2014). If conservative therapy is ineffective and/or neurological deficits are present, patients are indicated for surgical treatment (Davison M. A. et al., 2021). For a long time, the preferred method of surgical treatment of patients with lumbar spinal stenosis in the presence of degenerative spondylolisthesis is open decompression, necessarily supplemented by stabilization using the technique of transforaminal lumbar interbody fusion (Konovalov N.A. et al., 2015; Harms J. G., 1998; Kepler C. K. et al., Chrastil J., 2012; Martin C. R., 2007; Brodano G. B. et al., 2015; Kakadiya G. et al.).

According to a number of authors, for high-grade degenerative spondylolisthesis, there is no doubt about the superiority of stabilizing operations over decompression. However, in the case of grade I spondylolisthesis, given the fact that up to 80% of them are pathologically stable due to natural degenerative processes in the lumbar spine, the need for additional stabilization remains controversial (Ghogawala Z. et al., 2017; Austevoll I. M. et al., 2017; Austevoll I. M. et al., 2020). In the last decade, a large number of works have appeared in the world literature confirming the effectiveness of minimally invasive techniques without the use of instrumental stabilization in the treatment of patients with grade I degenerative spondylolisthesis in combination with lumbar spinal stenosis. These techniques can minimize injury to surrounding tissues, reduce blood loss, accelerate activation and postoperative rehabilitation of patients, and reduce the cost of surgical treatment. And considering that 72-88% of patients with degenerative lumbar stenosis, according to Carreon

L.Y. (2003), have severe concomitant pathology and there is a global trend towards population aging, this method may be an option of choice for this age group (Sasai K., 2008; Jang J. W. et al., 2016; Mori G. et al., 2016; Park J. H. et al., 2012; Austevoll I. M. et al., 2020).

However, the disadvantage and limiting factor of the widespread use of this method is, in the opinion of most authors, the risk of iatrogenic destabilization of the operated segment, recurrence of neurological symptoms and, as a result, an increased likelihood of repeated surgical treatment. Thus, most foreign and domestic surgeons adhere to the "gold" standard, using various decompression techniques with mandatory segment stabilization in grade I degenerative spondylolisthesis combined with lumbar spinal stenosis. Extensive laminectomies, which disrupt the stabilizing function as a result of resection of bone and ligamentous structures, and rigid segment fixation are associated with a large number of intra- and postoperative complications. And given the fact that most patients with lumbar stenosis have severe concomitant pathology due to their age, the issue of minimizing the risk of surgical treatment in this category of patients is quite acute. A large number of works in foreign and domestic literature have been devoted to the problem of surgical treatment of grade I degenerative lumbar spondylitis and spinal stenosis (Mori G. et al., 2016; Dohzono S. et al., 2013 Blumenthal C., 2016; Austevoll I. M. et al., 2020; Kalinin A.A., 2015, Krutko A. V., 2013, Klimov V.S., 2017;). These studies evaluated the clinical and radiological outcomes of surgical treatment of patients with grade I degenerative lumbar spondylolisthesis and spinal stenosis using one of the proposed methods separately. In the studies of Ghogawala Z., (2018); Park J.H., (2012), a comparative assessment of the postoperative outcomes of minimally invasive bilateral decompression and decompression-stabilizing intervention using the technique of posterior lumbar interbody fusion was performed. In the Russian-language literature, studies have been conducted to compare these methods of surgical treatment for lumbar spinal stenosis without spondylolisthesis, and the authors have identified the presence of displacement of any degree as a sign of segment instability that requires stabilization to reduce the risk of adverse outcomes (Konovalov N.A., 2015; Mlyavykh S.G., 2019, Grin A.A., 2019). Currently, there is a contradiction of opinions in the foreign and domestic literature regarding the expediency and effectiveness of decompressive operations as a possible alternative to decompressive-stabilizing interventions.

Studies aimed at comparative analysis of the results of minimally invasive isolated decompression and open decompression with segment stabilization are insufficiently studied in foreign literature. There are no similar studies in the Russian literature. In this regard, this paper collectively evaluates the clinical outcomes of surgical treatment of patients operated on by bilateral microsurgical decompression from unilateral access and by transforaminal lumbar interbody fusion, performs a comparative assessment of their clinical effectiveness, assesses the instability of the operated segments in the preoperative period and the degree of its increase in the postoperative period in the decompression group, assesses the frequency of occurrence radiological signs of adjacent segment syndrome in the stabilization group; In addition, based on the data obtained, a clinical and instrumental algorithm for choosing surgical treatment tactics has been developed. A comprehensive analysis and comparative assessment of the clinical outcomes of surgical treatment of patients with grade I spondylolisthesis combined with lumbar spinal stenosis using bilateral microsurgical decompression from unilateral access and open decompression with segmental stabilization was carried out. It has been established that each of the proposed methods can significantly statistically reduce back pain rates for VAS to 1.0 (1.0; 2.0) and 2.5 (2.0; 3.0) points, respectively, and lower limb pain rates for VAS to 1.0 (1.0; 2.0) and 1.5 (1.0; 2.0) points, respectively, to improve the quality of life and ability to work of patients according to the Oswestry index in the long-term postoperative period to 14.0 (12.0; 18.0)% and 16.0 (14.0; 18.0)%. A comparative assessment of the two surgical methods based on the VAS pain index and the Oswestry disability index revealed no statistical differences in their clinical effectiveness. A statistically significant difference was found between the two methods in terms of back pain compared with a higher value of this indicator in the stabilization group.

The X-ray dynamics of spinal degenerative changes in the group of bilateral microsurgical decompression from unilateral access was studied. A statistically significant slight increase in the

values of the instability criteria of the operated segment was found according to functional radiographs. However, this circumstance did not affect the clinical outcomes and results of surgical treatment in the long-term postoperative period. In the group of transforaminal lumbar interbody fusion, the frequency of occurrence of radiological signs of adjacent-level syndrome was assessed. These signs were found in 16.7% of the operated patients. Based on the study of clinical and radiological outcomes, a diagnostic algorithm is proposed for choosing the optimal method of surgical treatment of grade I degenerative lumbar spondylolisthesis combined with spinal stenosis, which allows, based on a preoperative assessment of the clinical picture, functional radiography, and MRI data, to choose the most appropriate method of surgical treatment of this pathology and thus reduces the risks of surgical treatment, unjustified surgical aggression and improve the overall outcomes of surgical treatment.

Conclusion. It is based on an anatomical and functional approach, which aims to assess the clinical effectiveness of each surgical treatment method, the dynamics of X-ray changes in the postoperative period, and a comparative analysis of the effectiveness of the two methods, taking into account the assessment of the risk of complications. The clinical effectiveness of these techniques in everyday clinical practice has been studied. The patients underwent a general clinical and neurological examination, an objective assessment of the severity of pain syndrome (on the VAS scale), quality of life and ability to work (on the Oswestry scale). The main neuroimaging methods in our study were: magnetic resonance imaging, spondylography in lateral projection in neutral projection, with functional tests in the position of frontal flexion and extension, multispiral computed tomography.

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