SURGICAL TREATMENT OF SPONDYLOLISTHESIS OF THE L5 VERTEBRA AND INTERVERTEBRAL DISC HERNIATION OF L4-L5 AND L5 - S1 USING TRANSPEDICULAR FIXATORS

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Annotation. The aim of this work is to analyze our own results of surgical treatment of 30 patients with isthmic spondylolisthesis of the L5 vertebra , which was treated with the transpedicular fixation (TPF) method using various types of transpedicular structures and methods of their installation in combination with various methods of anterior spondylodesis.

Key words: spondylolisthesis, surgical treatment, transpedicular fixators.

The results of surgical treatment of 30 patients with isthmic spondylolisthesis of the L5 vertebra . Displacements of grades I – II were present in 10 patients, grades III – IV – in 17 patients, and spondyloptosis – in 3 patients. All patients underwent transpedicular fixation (TPF) of the cervicosacral spine using various designs. Depending on the level of fixation, 4 groups were identified: patients in group I underwent fixation of two segments, screws were inserted into L4 , L5 , and S1 vertebrae; in the remaining groups, fixation of three segments was performed, while in group II , screws were inserted into C3 , L4 , L5 , and S1 vertebrae, in group III – into C3 , L5 , and S1 vertebrae, and in group IV – into C3 , L4 , and S1 vertebrae. Posterior fixation was combined with interbody spondylodesis L 5– S 1, performed using various techniques.

Clinically, the treatment results were assessed as good in 93.3% of cases. Satisfactory results in 6.7% of cases occurred due to the development of mild paresis of the extensor muscles of the foot and toes in two patients after surgery. Remote results were monitored in 16 patients, the average follow-up period was 29 months. Radiographically, with the exception of patients with fractures of the structures, the fixation of the cervicosacral region was stable. Fracture of the metal structures occurred in 7 patients (23.3%), in 6 of whom anterior fusion was not performed. In this case, there was a partial loss of reduction. Clinically, fractures of the metal structure did not lead to deterioration. After performing interbody spondylodesis L5 – S1 cortical transplants also stabilized the cervicosacral region. Radiographic parameters characterizing changes in the anatomical and biomechanical relationships of the cervicosacral region before and after surgical treatment were calculated. Analysis of treatment results indicates the effectiveness of TPF in combination with interbody Spondylodesis in the treatment of spondylolisthesis . The use of primary stable spondylodesis in severe cases of spondylolisthesis is justified. L 5– S 1 cortical

transplant. The goal of surgical treatment for spondylolisthesis is to eliminate pain, restore anatomical relationships and stabilize the cervical-sacral spine [10]. The transpedicular fixation technique, widely used in the surgical treatment of spinal pathology, including spondylolisthesis , has shown its high effectiveness [6]. The importance of interbody spondylodesis L 5– S 1 is emphasized by most authors, and various methods and techniques for its implementation are also reported [2–4, 11]. There are no data in the literature on comparative analysis of the results of different methods of installing transpedicular fixators.

Material and methods. In the neurosurgery departments of the Andrei GosMI and the Altai Branch of the Russian Scientific Center for Emergency Medical Care, 57 patients with spondylolisthesis underwent surgical treatment using transpedicular fixation. In most cases (30 patients), there was isthmic spondylolisthesis of the L5 vertebra . We analyzed the treatment of this group of patients. The age distribution was as follows: from 11 to 20 There were 20 patients aged 18 to 40 years, 7 patients aged 21 to 40 years, and 3 patients aged 41 to 55 years. There were 12 male and 18 female patients. The preoperative instrumental examination included standard and functional radiography of the cervical and sacral spine and myelography , CT combined with myelography , and MRI. A spondylolytic defect of the L5 vertebral arch was detected in 22 patients. Dysplastic changes such as a flattened, elongated L5 vertebral arch , a rounded, deformed superior endplate of the first sacral vertebra, and non-fusion of the posterior elements of the cervical and sacral vertebrae in 8 cases were observed. Depending on the degree of displacement according to Meyerding, the distribution of patients was as follows: spondylolisthesis I degree – in two patients, II degree – in eight, III degree – in twelve, IV degree – in five; spondyloptosis was detected in three patients . Thus, displacements of I – II degree were observed in 33.3% of patients, severe and extremely severe – in 66.7%. In all cases, patients complained of pain syndrome leading to limitation of physical activity. Complaints of pain only in the cervical and sacral region were presented by 5 patients, pain both in the cervical and sacral region and in the lower extremities was bothered by 25 patients, and in 6 of them the irradiation of pain was bilateral. In one case, an 11-year-old girl was observed with cervicofemoral rigidity syndrome (Fuhrmeyer syndrome). In one 34-year-old patient , lumbago was combined with intermittent myelogenous claudication syndrome . In one case, a 39-year-old patient with spondyloptosis was found to have secondary unilateral L5 paretic syndrome (decrease in the strength of the extensors of the foot and toes to 2 points) and severe hypotrophy of the lower leg muscles on the affected side. Sensory disturbances in the form of transient paresthesia and hypoalgesia in the innervation zone of the L5 and S1 roots were noted in 7 patients. Two patients had previously undergone surgery for spondylolisthesis in other clinics with unsatisfactory results. Long-term results were monitored in 16 patients, the average follow-up period was 29 months (from 9 months to 6 years). To

determine and characterize changes in the cervical-sacral region in spondylolisthesis before and after surgical treatment, we performed a series of measurements on lateral radiographs [1, 10]. The following parameters were assessed:

1) the degree of displacement in percentage terms;

2) the magnitude of cervical lordosis in degrees along the upper endplates of the C 1 and L 5 vertebrae;

3) the angle of sagittal rotation, measured between the perpendicular drawn to the tangent to the sacrum and the line drawn along the anterior edge of the body of the L5 vertebra ;

Mitbreit displacement angle ;

5) the angle of inclination of the L5 vertebra – the angle between the line passing through the centers of the anterior and posterior edges of the body of L5 and the horizontal line;

6) tilt of the cervical spine – the angle between the line connecting the centers of the bodies of the C 1 and L 5 vertebrae and the horizontal;

7) slope of the sacrum L 5 angle between the tangent to the sacrum and the vertical;

8) inter-link angle L5 – the angle between the lines connecting the centers of the bodies of the L4 – L5 and L5 – S1 vertebrae;

9) interlink angle S 1 – between the lines connecting the centers of bodies L 5– S 1 and S 1– S 2. Results

Clinically, all patients demonstrated complete regression of pain symptoms during the postoperative period and subsequent follow-up. All patients returned to full physical activity and resumed their studies and work activities within a year after surgery. All patients, with the exception of two who developed neurological complications after surgery, were completely satisfied with the treatment.

Discussion

Surgical treatment of spondylolisthesis is a pressing issue in vertebrology and is widely discussed in the modern literature. As noted by virtually all authors, there is currently no consensus on the choice of tactics and methods for surgical treatment of spondylolisthesis . Transpedicular fixation, widely used in modern spinal surgery, including the treatment of spondylolisthesis , offers a number of advantages over others. These include the possibility of segmental fixation, rigidity, and primary stability of fixation, which significantly reduces the time to functional recovery after surgery. Improvements in transpedicular fixators and the use of multiaxial screws facilitate the installation of the device in deformities and make it possible to perform reduction of the displaced vertebra through a posterior approach [10]. Particular importance is given to the issue of reducing the displaced vertebra and eliminating the anatomical and biomechanical disturbances that occur with spondylolisthesis . To evaluate these changes and correct them after surgery, both our scientists and foreign

ones have proposed a whole series of radiometric characteristics [1, 9]. While significant reduction is possible with small degrees of displacement, in cases of large displacements, reduction is much more complex and, to a certain extent, limited. When using reduction and fixation with transpedicular structures for severe displacements, our results are generally comparable with literature data in a number of parameters [11], except for cases where reduction was achieved through anterior resection of the displaced vertebra and fixation of L4 to S1 . Reduction rates in such cases are higher, but it is necessary to note the greater technical difficulties and risks associated with such operations [3].

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