

## THERAPY FOR COMPLICATED DEGENERATIVE STENOSIS OF THE LUMBOSACRAL SPINE SEGMENT IN ELDERLY PATIENTS

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The paper presents a retrospective analysis of surgical treatment of 22 elderly patients aged 60 to 80 years who had complicated degenerative stenoses of lower thoracic and lumbar spine segments associated with neurological deficits ranging from mild peripheral manifestations to severe unilateral and bilateral paresis. The severity of degenerative spine lesions and compressive stenosis of spinal canal contents correlated with patients' age and culminated in the maximal degenerative stenotic alterations, up to  $5.5 \pm 0.9$  mm, at the L3 to L5 level at the age of  $76.5 \pm 1.4$  years.

Surgery performed to decompress the spinal canal and cauda equina roots and to stabilize the spine with Stryker and Fixpain transpedicular inner fixation and correction devices resulted in the regress of neurological deficits and restoration of lower limbs motor functions up to the capability of unassisted locomotion in old age.

**Keywords:** *marine medicine, degenerative stenoses of the spine, old age, spinal canal decompression, transpedicular devices*

**Introduction.** Spinal stenosis canal is a common disease in pension and late adulthood. This narrowing of the spinal canal is registered by computed tomography, magnetic resonance imaging, or roentgenography of the spine and accompanied by a number of clinical symptoms of nerve root disorders [1, p.11-14; 2, p. 43-56]. MRI in patients over 60 years of age revealed that 21% of them had X-ray signs of narrowing of the spinal canal at the lumbar level. One third of them (33.3%) presented stenotic complaints of numbness and weakness in the distal parts of the lower limbs. Patients with a local compression of neurovascular elements are subjected to microsurgical decompression (interlaminectomy and fenestration of the plate portion of the arcus vertebrae) [3, p. 22-37; 4, p.190-191]. Patients with a central stenosis are subjected to laminectomy with conservative resection of articular processes on both sides (up to 50%). Degenerative instabilities of a spinal motion segment (SMS) require a distractor in combination with bone-plastic spondylodesis [5, p. 11-14].

The goal of the study was to analyze the results of operative and restorative treatment of complicated degenerative stenoses of the lumbar spine accompanied by neurologic disorders of different severity against the background of concomitant somatic diseases in group of senior age patients consisting of pensioners of the Ministry of Defense of the Russian Federation residing in the Murmansk region.

**Materials and methods of the study.** The study is based on 22 cases of treatment of patients of the senior age groups, the pensioners of the Navy living in Severomorsk and Murmansk, with complicated degenerative stenosis of the lower thoracic and lumbar spine, operated at the Navy Clinical Hospital No 1469 of the Ministry of Defense of Russia in the period from 2006 to 2016.

**Results of the study:** 11 of the 22 patients (50.0%) were aged 60-65 years, 6 (27.3%) — 66-70, 3 (13.6%) — 71-75, and the rest 2 (9.1%) — 76-80 years. The degree of neurologic motion impairment was graded as a peripheral mild bilateral paresis for 13 of the 22 (59.1%), as a peripheral moderate unilateral paresis — for 5 (22.7%), as a moderate bilateral paresis — for 3 (13.6%), and as a severe unilateral paresis — for 1 of them (4.5%). Dysfunction of the pelvic organs in the form of acute retention of urination was recorded in 2 patients (9.1%), and in the form of mandatory urges — in 3 patients (13.6%). The maximal expressed degenerative stenotic lesions were detected at the level of the spinal motion segments Th12-L1 in 1 patient (4.5%), L1-L2 — in 3 (13.6%), L1-L2-L3 — in 2 (9.1%), L2-L3-L4 — 6 (27.3%), L3-L4-L5 — in 8 (36.4%), and L4-L5-S1 — in 2 (9.1%). According to the MSCT, stenosis of the spinal canal was 3-4 mm in 2 of the groups of patients (9.1%), 5-6 mm — in 4 (18.2%), 7-8 mm — in 7 (31.8%), and 9-11 mm — in 9 (40.9%). The maximum degenerative pseudo-spondylolisthesis of the 1<sup>st</sup> grade was diagnosed in 7 cases (31.8%), 2<sup>nd</sup> — in 5 (22.7%), 3<sup>rd</sup> — in 2 (9.1%), and 4<sup>th</sup> — in 1 (4.5%), while two levels — in 3 cases (13.6%) (Table 1).

**Table 1****Levels of degenerative stenotic compression lesions of the lower thoracic and lumbar spine in groups of patients of senior age**

Level of the diseased segments	Th12 - L1 1(4.5%)	L1 - L2 3(13.6%)	L1-L2-L3 2(9.1%)	L2-L3-L4 6(27.3%)	L3-L4-L5 8(36,4%)	L4-L5-S1 2(9,1%)
Age of the senior patients	60-65 11(50.0%)			66-70 6 (27.3%)	71-75 3(13.6%)	76-81 2(9.1%)
Size of the stenosis M±m	10.8 mm 10.8±0.94	9.1-3.6mm 9.7±1.23	7.3-11.5mm 8.2±1.64	4.9-12.2mm 6.6±0.75	3,4-8,7mm 5,5±0,96	8,3-10,1mm 9,1±0,54
Spondylololysis M±m	-	1.2-2.2mm 1.5±0.43	2.6-3.7mm 3.1±0.85	3.1-7.9mm 5.8±1.24	4,2-11,6mm 7,8±2,53	5,8-12,3mm 9,4±2,06
Neurologic impairment	Mild unilateral or mild bilateral paresis 13(59.1%)			Moderate uni-ateral paresis 5(22.7%)	Moderate bi-lateral paresis 3(13.6%)	Severe uni-lateral paresis 1(4.5%)

Associated somatic diseases were present in all patients in each senior age group: coronary heart disease in 13 of the 22 patients (59.1%), stage 1 or stage 2 hypertension — in 11 (50.0%), stage 3 hypertension — in 7 (31, 8%), urolithiasis — in 10 (45.4%), chronic renal failure — in 2 (9.1%), and duodenal ulcer in remission — in 4 (18.2%). In the 22 senior age patients with degenerative stenosis of the spine there was found 66 chronic internal diseases in remission: IHD — 13 (19.7%), stage 1 or stage 2 hypertensive disease — 11 (16.0%), stage 3 hypertension — 7 (10.6%), chronic renal failure — 2 (3.0%), urolithiasis — 10 (15.2%), peptic ulcer disease — in 4 (6.1%), and the number of other chronic diseases detected in them (cardiovascular, pulmonary, urogenital, gastrointestinal tract, etc.) accounted for 19 (28.8%) (Table 2).

**Table 2****Chronic somatic diseases in senior age patients with complicated degenerative diseases of the spine**

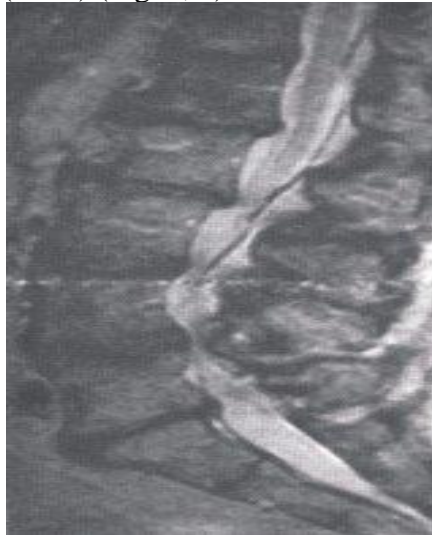
Chronic somatic diseases	Ages of the senior patients in the group (years)				TOTAL
	60-65	66-70	71-75	76-80	
CHDC	6	4	1	2	13(19.7%)
1-2 HD	5	3	2	1	11(16.6%)
3 HD	3	2	1	1	7(10.6%)
HRF	-	1	1	-	2(3.0%)
Urolithiasis	4	3	2	1	10(15.2%)
Duodenal ulcer	2	1	1	-	4(6.1%)
Other diseases	7	5	4	3	19(28.8%)
Total in the group	27(40.9%)	19(28.7%)	12(18.3%)	8(12.1%)	66(100.0%)

In the age group of 60-65 years, coronary heart disease was diagnosed in 6 patients (50.0%), stage 1 or stage 2 hypertension — in 5 (41.7%), stage 3 hypertension in — 3 (25.0%), urolithic disease — in 10 (83.3%), peptic ulcer — in 2 (16,7%), and other chronic diseases — 7 cases (58.3%). In the age group of 66-70 years, coronary heart disease was detected in 4 of the 6 senior patients (66.7%), stage 1 or stage 2 hypertension — in 3 (50.0%), stage 3 hypertension — in 2 (33.3%), chronic renal failure — in 1 (16.7%), peptic ulcer disease — in 1 (16.7%), and other chronic diseases — in 5 cases (83.3%).

In the age group of 71-75 years, the specific gravity of chronic diseases increased: coronary heart disease — up to 33.3%, stage 1 or stage 2 hypertensive heart disease — up to 100.0%, and urolithiasis — up to 66.6%. In patients aged 76-80 years, both IHD and 1-3 HDI were detected in 100% of patients (Table 2).

Operations on decompression of the spinal canal with removal of one half-arcus vertebrae (interlaminectomy) of the L1 vertebra in 1 (4.5%) patients, L2 — in 2 (9.1%); the arcum vertebrae L3 — in 2 (9.1%), L4 — in 5 (22.7%), L5 — in 2 (9.1%), and the two half-arcum vertebrae: L2 and L3 — in 3 (13.6%), L3 and L4 — in 3 (13.6%), and L4 and L5 — in 3 (13.6%). Back inner correction and fixation of the spine by with

the Stryker and Fixpain transpedicular inner fixation and correction devices were performed on one motion segment of L3-L4 in 2 cases (9.1%), L4-L5 — in 5 (22.7%), L5-S1 — in 2 (9.1%); and on two motion segments L3-L4-L5 and L4-L5-S1 — for 1 case (4.5%) (Fig. 1, 2).



**Fig. 1.** MRI of patient T, 68 years old, with a two-level combined degenerative stenosis of the lumbar spine at the level of L3-L4, L4-L5 vertebrae, osteochondrosis, deforming spondylosis of the lumbar part of the spine.



**Fig.2.** The operation of L5 laminectomy, spinal canal and neural structures decomposition, spine back inner correction and fixation with the Stryker transpedicular device in L4-L5 motion segment in patient T, 68 years old, with moderate bilateral paresis.

Clinical improvement in the form of regression of the lower flaccid mild bilateral paresis occurred in 12 of 13 senior age patients (92.3%). The recurrence of the moderate unilateral paresis to the mild one occurred in 2 cases among the 5 patients (40.0%), and complete regression took place in the rest 3 cases (60.0%). In another 3 senior age patients, a moderate bilateral paresis regressed to a mild one in 1 case (33.3%) and to full strength in the extremities — in the rest 2 cases (66.7%). Severe right-sided peripheral paresis of the right foot, which had been regressed to a moderate form, was registered in 1 patient (100.0%).

In the recovery period, neurotropic (neuromedin, mexidol), vascular (pentoxifylline, trental), vitamin therapy (B1, B6), physiotherapy (amplipulse, magnetotherapy), hyperbaric oxygenation (0.2atm), lower limb massage, and physical therapy complex were carried out. Regression of mild bilateral paresis occurred within 7-18 days after surgical treatment ( $M\pm m=12.6\pm 1.4$  days). The recurrence of moderate unilateral paresis to a mild form and complete recovery against the background of restorative treatment took a period of 24 to 46 days ( $M\pm m=33.2\pm 2.9$  days). Moderate bilateral paresis regressed in the senior age patients for 42-67 days ( $M\pm m=58.6\pm 4.2$  days). Severe right-sided peripheral paresis of the right foot regressed to moderate form in 73 days.

The follow-up period for patients in the postoperative long-term period was from 3.7 to 15.4 years ( $7.2\pm 0.8$  years). Neurological disorders regressed from 24 days in mild lower bilateral pareses and up to 73 days in severe unilateral paresis. There were 2 cases of exacerbation of urolithiasis in the immediate postoperative

period in patients in the age groups of 60-65 years and 71-75 years and 1 case of hardening during the course of IHD in a patient in the age group of 76-80 years within 2 weeks after a surgical treatment. Recurrences of neurologic deficit, repeated dynamic growing paresis, as well as any paralyzes for all periods of the study in the senior age patients has not been observed. The radical desthenosis of areas of pronounced deforming spondylosis, spondyloarthrosis, and spondylolisthesis, including with inner fixation and correction of the spine, taking into account the onset of this process as the completion and final stage of age-long degenerative lesions in the spine against the background of the hypoactive metabolism of the elderly organism, proved to be sufficient and the optimal for restoring the anatomical dimensions of the spinal canal for remained active life of the patients.

### Conclusions

1. Degenerative and dystrophic diseases of the spine in the lower thoracic and lumbosacral regions in patients of senior age groups cause pronounced stenotic alterations with compression of the neural structures of the spinal canal and development of peripheral lower bilateral pairs and unilateral pareses, as well as disorders in the pelvic organs.

2. The severity of degenerative spine lesions and compressive stenosis of spinal canal contents correlated with patients' age and culminated in the maximal degenerative stenotic alterations, up to  $5.5 \pm 0.9$  mm, at the L3 to L5 level at the age of  $76.5 \pm 1.4$  years.

3. Neurological disorders progress from mild peripheral to severe unilateral and bilateral pareses and are directly dependent on degenerative and stenotic phenomena growing progressively with the age.

4. Concomitant chronic somatic diseases were present in all groups of patients of senior age from 60 to 80 years old with degenerative stenoses of the spine: coronary heart disease — in 59.1%, stage 1 or stage 2 hypertension — in 50.0%, stage 3 hypertension — in 31.8%, urolithiasis — in 45.4%, chronic renal failure — in 9.1%, and duodenal ulcer in the stage of remission — in 18.2% of cases. An additional examination of the condition and function of organs and systems was required, as well as an assessment of the status of compensation and a medical correction before the surgery.

5. Surgery performed to decompress the spinal canal and cauda equina roots and to stabilize the spine with Stryker and Fixpain transpedicular inner fixation and correction devices resulted in the regress of neurological deficits and restoration of lower limbs motor functions up to the capability of unassisted locomotion in old age

6. The period of follow-up of patients in the postoperative long-term period was from 3.7 to 15.4 years ( $7.2 \pm 0.8$  years). Neurologic disorders regressed from 24 days in mild lower bilateral pareses and up to 73 days in a severe unilateral paresis. Recurrences of neurologic deficit, repeated dynamic growing paresis, and paralysis have not been observed for all periods of the study in elderly patients.

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