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The impact of coping strategies on treatment outcomes in older patients with degenerative dorsopathies

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Abstract

Introduction Dissatisfaction with conservative treatments of various types of dorsopathies results in increased number of surgical interventions to eliminate the accompanying clinical manifestations. Patients' psychosocial characteristics are likely to impact treatment satisfaction, and personality traits as cognitive status, depression, anxiety and coping strategies of the patient have a role. **The objective** of the study was to assess the impact of the coping strategies of a patient on surgical treatment outcomes in older patients with dorsopathy. **Material and methods** The study included 149 patients with dorsopathy aged 60 years and over. The patients were divided into 2 groups. The first group (n = 54) consisted of patients with central stenosis of the spinal canal (M48.0) who underwent minimally invasive surgeries without stabilization. The second group included 95 patients with degenerative spondylolisthesis and unstable VMS (M43.1, M53.2). A variety of decompression and stabilization surgical technologies were employed for the patients. **Results** The majority of patients in the first group (n = 46, 85 %) obtained satisfactory surgical outcome. Eight patient (15 %) had poor outcome. An inverse, moderate, statistically significant correlation was revealed between maladaptive coping strategies identified with Ways of Coping Questionnaire (distancing, avoidance), Stress Coping Questionnaire (behavioral avoidance of a problem), the Coping Strategy Indicator (avoidance) and surgical outcome. Surgical outcome was rated as satisfactory in 79 (83.2 %) cases and poor in 16 (16.8 %) patients of the second group (n = 95). Patients of the second group showed a greater number of coping strategies having a statistically significant correlation with treatment outcome. Patients with adaptive strategies resulting from decompression and stabilization operations had a more favorable outcome. Maladaptive coping strategies such as confrontation, avoidance and behavioral avoidance of the problem had a negative impact on treatment outcome. **Discussion** A comprehensive analysis of the questionnaire data showed that the more aggressive the intervention was with the use of fixation constructs, the greater the impact of the patient's coping strategies on the outcome of treatment observed. This relationship was not found in decompression cases with maladaptive strategies being most significant. **Conclusion** We can conclude about the predictive value of coping strategies based on the impact of the severity of adaptive and maladaptive coping strategies on the outcome and satisfaction with the surgical treatment of dorsopathies in older patients. This factor is essential for the preoperative stage to facilitate personalized treatment options for the complex group of patients.
Keywords: degenerative-dystrophic diseases of the spine, elderly and senile patients, neurosurgery, coping strategies, neuropsychological status

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INTRODUCTION

Dissatisfaction with nonoperative treatments of various types of dorsopathies results in greater surgical interventions aimed at addressing the accompanying clinical manifestations. S.S. Rajaee et al. reported 170.9 % increase of operations aimed to stabilize spinal motion segments between 1998 and 2008. However, the results of the interventions may not always be apparent for the patient and the operating surgeon and 10 to 40 % of the patients can develop failed back surgery syndrome (FBSS). The FBSS can be associated with a specific surgical technology being unadapted to individual characteristics of the patient rather than with a surgical error or particular surgery.

In recent decades, personalized medicine has been one of the leading trends in the development of strategies for treatment options. Traditionally, this term is associated with prescribing drugs and assessing the effectiveness depending on the genetic profile of the patient. The approach cannot fully reveal the essence of personalized medicine since the psychosocial characteristics of the patient would certainly affect the satisfaction with the treatment outcome. Factors including financial problems, functional status, psychosocial and emotional status are being considered. The role of such personality traits as cognitive status, depression, anxiety and coping strategies of the patient is reported in recent publications. The concept of coping was introduced by R. Lazarus and S. Folkman in the process of studying the transactional model of stress. The authors defined coping as the ongoing cognitive and behavioural efforts to manage exceeding external and internal demands which are assessed by the individual as either significant or as superior to his/her psychological and physical resources. In the Russian-language

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literature, the term is defined as a person's conscious use of methods of coping with difficult situations including communication, conditions and the conditions that give rise to them.

There are several options for evaluation coping strategies due to a variety of classifications and the ambivalent understanding of coping skills. Coping questionnaires used for the purpose and validated for the population of the Russian Federation include the Lazarus' Ways of Coping Questionnaire (WCQ), the Stress Coping Questionnaire (SCQ), the Diagnostic Method for Coping Strategies developed by E. Heim (DMCS), Maddi's Hardiness Test (HT), the Coping Strategy Indicator (CSI) developed by J. Amirkhan. Based on the above scoring systems adaptive coping strategies were shown to be essential for outcomes of complex therapy in cancer patients [8]. The behavioral reactions have not been explored as a factor influencing the outcomes of surgical treatment in patients with dorsopathies and a prospective cohort study that would clarifies the interactions may be relevant.

The objective of the study was to assess the impact of the coping strategies of a patient on surgical treatment outcomes in older patients with dorsopathy.

MATERIAL AND METHODS

The study was based on the results of a comprehensive examination and surgical treatment of 160 patients aged 60 and over diagnosed with dorsopathy including spinal canal stenosis, degenerative spondylolisthesis and unstable VMS: ICD 10 diagnostic codes of M 48.0, M 43.1, M 53.2. The design was a continuous, open, prospective cohort study. The study was approved by the local ethics committee and performed in accordance with ethical principles for medical research involving human subjects stated in the Declaration of Helsinki.

The patients received surgical treatment at the Neurosurgical Department No. 5 of the V.A. Almazov NMRC between January 2018 and December 2020. The inclusion criteria were patients aged 60 years and over who suffered degenerative spine disease and had indications for surgical treatment. The exclusion criteria were patients who had absolute contraindications to surgical treatment and decompensated chronic diseases, those who refused to participate in the study were not included in the review. The exclusion criteria were pedicle screw malpositioned during treatment, failed hardware or fusion, persistent compression after surgery, pain being not associated with the underlying disease. Incomplete survey responses were excluded from the study due to the impact on the validity of estimates. Overall 149 patients were included in the study. The age of patients ranged from 60 to 83 years with median age of 67 (64;71) years. There were 75 male and 74 female patients.

Physical examination of patients were performed and a survey with validated scales carried out preoperatively using VAS, the Oswestry Low Back Pain Disability Questionnaire, the Diagnostic Method for Coping Strategies developed by Heim, the Lazarus' Ways of Coping Questionnaire, the Coping Strategy Indicator, Hardiness Test (Leontiev and Rasskazova's adaptation), stress coping questionnaire (Rasskazova-Gordeeva-Osin version). Severity of spinal canal stenosis using Schizas grading system and signs of VMS instability were evaluated with neuroimaging (CT, MRI). The results of treatment were assessed using the VAS scale and the Oswestry Low Back Pain Disability Questionnaire. Strategies scored 0 on the Heim scale were rated as maladaptive, scored 1 as relatively adaptive and scored 2 as adaptive. The patients were divided into 2 groups. The first group (n = 54) included patients with central spinal canal stenosis (ICD 10: M 48.0) treated with minimally invasive surgical techniques. No stabilizing systems were employed. The second group consisted of 95 patients with degenerative spondylolisthesis and unstable spinal motion segments (ICD 10: M 43.1, M 53.2). The patients were treated using various decompression and stabilization surgical technologies. The groups were comparable in terms of age and gender, the results of preoperative assessment using the Oswestry questionnaire and comorbidity ($p > 0.1$ according to the results of the Mann-Whitney test). The goal of surgical treatment of a dorsopathy is to improve the quality of life of the patient by improving the parameters that are important for the patient providing patient satisfaction after surgical treatment. Treatment outcomes were assessed according to the extent of impaired quality of life and pain intensity using the Oswestry questionnaire and a ten-point visual analogue scale (VAS). Outcome was rated as satisfactory with pain decreased on the VAS scale to 1–2 points and 20 % decrease in the Oswestry questionnaire [4].

Statistical data analysis was performed using non-parametric tests. Microsoft Office Excel 2016 and STATISTICA 12 (StatSoft) were used to complete data analysis reports. The Kolmogorov-Smirnov criterion was less than 0.05 with primary statistical data processing which led to the use of non-parametric tests for the non-normal distribution of variables. Spearman's coefficient was used to assess the correlation between the quantified parameters. The assessment of the statistical significance of the correlation was carried out using the t-test. We set the significance threshold at $p < 0.05$. Numerical data were presented with median (Me) and lower and upper quartiles (Q1–Q3). The correlation coefficient ρ was interpreted using the Chaddock scale.

RESULTS

The first group of patients with central spinal stenosis (ICD, M 48.0) consisted of 28 male and 26 female patients. The median age was 70 (64; 74) years. All 54 patients with VAS scored 5 (4; 6) presented with vertebrogenic pain syndrome, polyradiculopathy, intermittent neurogenic claudication. ENMG demonstrated signs of injury to the sensory fibers of the nerves of the lower limbs (polyneuritis) seen in 70.4 % (n = 38) of cases. Changes in the electrical activity recorded from a motor unit were recorded in 29.6 % (n = 6) only. Patients of the group showed significantly impaired daily living activity with preoperative score of 44.4 (34; 51.1) with the adapted Oswestry questionnaire. Spinal stenosis up to grade D classified according to C. Schizas et al. was diagnosed in all cases with MRI. The patients were surgically treated with bilateral decompression using a unilateral over the top approach [19]. Surgical treatment resulted in clinical improvement in the vast majority (85 %, n = 46) of patients with a decrease in the severity of pain to 1 (1; 2) on the VAS scale, decrease in functional disability scoring 23.11 (17.8; 30) measured with the Russian version of the Oswestry questionnaire and rated as a satisfactory outcome. No evident positive dynamics in pain relief or in functionality estimated with the Oswestry questionnaire was seen in 15 % (n = 8) of patients whose outcome was rated as poor.

Our findings showed that neurological status of the patient, the choice of surgical strategy and technical performance (patients in the group were similar by these parameters) added by the characterological features of the patient had impact on the result of treatment. Statistical processing of the data revealed an inverse, moderately pronounced, statistically significant relationship between maladaptive coping strategies calculated with the WCQ (distancing, avoidance), SCQ (behavioral avoidance of the problem), CSI (avoidance) and the outcome of the operation (Table 1).

The second group (n = 95) included 22 patients (23.1 %) with single-level clinically significant spondylolisthesis and 73 (76.9 %) with degenerative instability of the spinal motion segment (M 43.1, M 53.2), a total of 47 male and 48 female patients. Median age was 66 (64; 71) years. Lumbar (100 %) and radicular (90.5 %) pain syndromes aggravated with changes in body position and physical activity were predominant clinical symptoms in the patients. Preoperative Oswestry and VAS scores showed no statistically significant differences compared with those in the first group and were estimated at 48 (38; 60) and 5 (4; 5) points, respectively. Imaging findings showed signs of instability of the spinal motion segments according to Panjabi and White in all cases and combined with spondylolisthesis in 23.1 %.

Decompression and stabilization operations were performed for the patients of the second group. A variety of neurosurgical treatments included standard techniques of TLIF, PLIF and the original technique of spinal fusion we modified with pedicle screws implanted along medialized routes. The technique was different from the traditional method with the starting point of the screw placed at the intersection of the horizontal line determining the level of the lower edge of the accessory process and the vertical line at the border of the lateral and the middle third of the base of the inferior articular process.

The screw was fixed parallel to the cortical bone at the transition of the lower articular process to the vertebral pedicle to reach the lateral cortical bone perforated on the lateral surface of the body of the latter under the superior endplate (RF patent No. 2735127). The technique provided reliable bicortical screw fixation in the bone including porous structures. There were no implant malpositions or structural instability in patients of the study group regardless of the method of implantation. Postoperative Oswestry and VAS scores measured 28 (22; 42) points and 1 (1; 3) point. Surgical treatment resulted in satisfactory (n = 79; 83.2 %) and poor (n = 16; 16.8 %) outcomes.

Table 1

Coping strategies that influenced the results of surgical treatment of patients in the first group

Questionnaire	Evaluation			
	Satisfactory Me (Q1;Q3), n = 46	Poor Me (Q1;Q3), n = 8	Spearman's Rank correlation coefficient (rs)	Spearman's Rank correlation coefficient (p)
WCQ: distancing	38.89 (33.33;44.44)	66.67 (50;69.44)	-0.36	0.007
WCQ: avoidance	37.5 (29.17;45.83)	54.17 (47.75;62.5)	-0.34	0.013
SCQ: behavioral problem avoidance	7 (6;8)	8.5 (8;9)	-0.39	0.005
CSI: avoidance	16 (15;18)	18 (16.5;21)	-0.29	0.03

Notes: WCQ, Lazarus' Ways of Coping Questionnaire; SCQ, Stress Coping Questionnaire; HT, Maddi Hardiness Test; CSI, the Coping Strategy Indicator (D.Amirkhan).

A greater number of coping strategies had a statistically significant relationship with the outcome of treatment in patients of the second group. Patients with the adaptive strategies shown in Table 2 had a more favorable outcome resulting from decompression and stabilization operations. Maladaptive coping strategies including confronting coping, avoidance, behavioral avoidance of the problem had a negative impact on the outcome of treatment (Table 3). Correlations between adaptive and maladaptive coping strategies were approximately similar (0.3–0.5).

Table 2

Adaptive coping strategies that influenced the results of treatment of patients of the second group

Questionnaire	Evaluation			
	Satisfactory Me (Q1;Q3), n = 79	Poor Me (Q1;Q3), n = 16	Spearman's Rank correlation coefficient (rs)	Spearman's Rank correlation coefficient (p)
SCQ: self control	66.67 (47.62;76.18)	38.10 (28.57;42.86)	0.48	0.000002
SCQ: seeking social support	66.67 (50;77.78)	44.44 (38.89;50)	0.35	0.0008
SCQ: accepting responsibility	58.33 (50;75)	41.66 (33.33;50)	0.35	0.00008
SCQ: planning for problem solving	72.22 (55.56;83.33)	38.89 (38.89;44.44)	0.46	0.000007
SCQ: positive revaluation	54.76 (42.86;66.67)	38.1 (33.33;38.09)	0.43	0.00034
SCQ: positive reformulation and personal growth	10 (8;12)	7 (6;7.5)	0.38	0.0002
SCQ: instrumental and social support	10 (8;12)	8 (7;8.5)	0.39	0.0002
SCQ: active coping	12 (10;13)	7.5 (7;8)	0.44	0.00015
SCQ: humor	6 (5;7)	4.5 (4;5)	0.25	0.02
SCQ: planning	12 (9;14)	7 (6.5;8)	0.48	0.00002
SCQ: acceptance	9 (7;11)	8 (6;8)	0.23	0.03
SCQ: suppression of competitive activity	10 (8;12)	8 (7;8)	0.28	0.008
HT: engagement	40 (35;44)	33 (30;34)	0.41	0.00005
HT: control	27 (24;30)	24 (21;24)	0.39	0.0001
CSI: problem solving	27 (25;29)	23 (20;23)	0.47	0.00003

Notes: WCQ, Lazarus' Ways of Coping Questionnaire; SCQ, Stress Coping Questionnaire; HT, Maddi Hardiness Test; CSI, the Coping Strategy Indicator (D.Amirkhan).

Table 3

Desadaptive coping strategies that influenced the results of treatment of patients of the second group

Questionnaire	Evaluation			
	Satisfactory Me (Q1;Q3), n = 79	Poor Me (Q1;Q3), n = 16	Spearman's Rank correlation coefficient (rs)	Spearman's Rank correlation coefficient (p)
WCQ: confrontating coping	44.44 (33.33;50)	50 (38.89;55.56)	-0.21	0.049
WCQ: avoidance	41.67 (33.33;45.83)	45.83 (45.83;66.67)	-0.33	0.002
SCQ: negation	8 (7;8)	8,5 (7.5;10.5)	-0.26	0.015
SCQ: behavioral problem avoidance	7 (7;8)	9 (8;9.5)	-0.26	0.015

Notes: WCQ, Lazarus' Ways of Coping Questionnaire; SCQ, Stress Coping Questionnaire.

DISCUSSION

Despite the use of improved diagnostic methods, new surgical technologies and appropriate surgical interventions the results of treatment are not always rewarding for the patient and the surgeon. Coping strategies of the patient are of greater interest to researchers among the factors influencing the outcome of surgical treatment. I.V. Zalutsky et al. investigated psychological aspects of oncological patients and reported the importance of coping strategies of patients as one of the factors that had an evident impact on the treatment process, general condition and quality of life of a cancer patient. A high level of social support combined with an active behavioral strategy facilitated success of the treatment. Patients with problem-solving strategies (problem-based strategies) often showed better outcomes and quality of life. In 2005, a study was conducted to explore the impact of coping strategies on the treatment of patients with ovarian cancer. The authors concluded that the correction of maladaptive and destructive coping strategies could lead to improved quality of care for patients with the pathology. Groups of emergency and elective patients who underwent surgeries in a surgical clinic and oncological patients undergoing mutilation operations were compared. Elective surgical cases and oncological patients were characterized by similar behavior in critical situations depending on a psychosomatic type with emotional inhibition and excessive overcontrol reported. Emergency patients were similar to healthy individuals in their psychological status. Therefore, elective surgical patients would need preoperative and postoperative psychological correction and psychotherapy in accordance with their personality types and adaptive resources.

In 2014, Italian scientists explored the quality of life, degree of disability, self-perception and coping strategies of patients with tumor, vascular diseases and spinal pathology undergoing neurosurgical procedures. Greater disability was revealed in spinal patients. The preoperative period was defined as critical and coping strategies, quality of life, disability and self-awareness were found to be practical for a personalized treatment plan and improved management of each patient. Yoni K. Ashar et al. reported 151 patients with chronic back pain who received psychological treatment sessions over 4 weeks and showed substantial pain relief compared to placebo patients. This indicated to psychologist and psychotherapist services needed for this cohort of patients.

Our findings showed that coping strategies were an important component of both the patient's personality and the treatment process having a direct impact on the latter. Coping strategies are a modifiable parameter and patients with maladaptive strategies require extensive, durable preoperative preparation. In our opinion, the Stress Coping Questionnaire and the Coping Behavior Questionnaire can be considered the most convenient and practical tools for personalizing the focus of the training despite their external ponderosity. A statistically significant relationship between personality accentuations and questionnaire results was observed in our series. Survey findings suggested the more aggressive the intervention was with the use of fixation constructs, the greater the influence of the patient's coping strategies on the outcome of treatment observed. The correlations were not observed with decompression interventions demonstrating the most significant use of maladaptive strategies.

The result of treatment was rather associated with fixation systems used for impaired sagittal balance, in particular, that would require revision of the patient's stable lifestyle stereotypes at a short term than with a traumatic surgical intervention. Exercise therapy, athletics, posture correction, rehabilitation that would carry a certain burden for the patient and require greater involvement in the treatment process needed for a successful outcome of surgical treatment but may be limited by neuroplasticity resources. Patients undergoing minor decompression surgeries did not need a long-term lifestyle change or rehabilitation postoperatively due to the relief of the leading neurological symptoms and a rapid clinical effect. Coping strategies were shown to be extremely important in spinal surgery of older patients, in particular, to overcome a stressful situation during recovery.

CONCLUSION

We can conclude about the predictive value of coping strategies based on the impact of the severity of adaptive and maladaptive coping strategies on the outcome and satisfaction with the surgical treatment of dorsopathies in older patients. This factor is essential for the preoperative stage to facilitate personalized treatment options for the complex group of patients.

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