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The quality of life of lumbar compression radiculopathy patients under microsurgical treatment

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ABSTRACT

Aim. The present study aimed to conduct a prospective comparative analysis of the quality of life of patients up to 12 months after microsurgical treatment of lumbar compressive radiculopathy. Methods. A prospective study involving 120 patients with lumbar compressive radiculopathy operated on at the State Institution "Republican Specialized Scientific and Practical Medical Center of Endocrinology named after Academician Y.Kh. Turakulov" from January 5, 2020 to November 2021. The main group included 60 patients (32 men, 28 women, with mean age of 43.2 years). The comparison group also included 60 patients (34 men and 26 women, with mean age of 45.9 years). In the main group, the tubular technique was used, and in the comparison group, the Caspar microsurgical discectomy method. The Oswestry Disability Index (ODI) ranged from 30% to 98%. Quality of life was assessed using the 36-item short form (SF-36) health survey at 3, 6 and 12 months. Results. The vast majority of patients, (87.5% of the main group and 71.1% of the comparison group) had no restrictions (χ^2=4.509; df=1; p=0.034). In the main group of patients, physical well-being was increased from the initial 32 to 56 points, and mental well-being increased from 43 to 57 points, while in the comparison group these indicators were significantly lower and amounted to 46.7 and 48.4 points. In the immediate period after the operation, significant differences (p<0.05) were obtained in terms of physical (34.2±8.2 vs. 29.5±5.2), role functioning and social functioning (58.6±7.8 vs. 51.2±8.8) and vital activity (56.1±6.3 vs. 49.9±8.0). After 12 months, the differences were also statistically significant and the average quality of life score was 82.6 points in the main group and 78.6 points in the comparison group. Conclusion. The tubular technique of microsurgical treatment of lumbar compressive radiculopathy is characterized by a faster recovery of the patient's functional status, a low recurrence rate of pain and radicular syndromes, and better indicators of quality of life.

ORIGINAL ARTICLE

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INTRODUCTION

Lumbar radiculopathy with the development of compressive radicular and pain syndromes is the most common disease of the musculoskeletal system and peripheral nervous system worldwide, and is associated with suffering and significant social costs [1, 2]. The decrease in the quality of life of this category of patients is characterized by long-term disability and the need for expensive examination and treatment. With inadequate assessment of the existing symptoms of degeneration, permanent disability with significant neurological deficit may occur [3, 4].

Increasing possibilities of microsurgery in the treatment of patients with lumbar compressive radiculopathy are being improved, minimally invasive methods are being developed, but the existing problems in the area of surgical intervention, relapses of lumbar compressive radiculopathy require optimization of the surgical manual, methods and methodologies of surgical treatment and diagnosis [1, 5, 6].

It is impossible to achieve an increase in the effectiveness of the results of microsurgical treatment of lumbar compressive radiculopathy without knowledge of the factors influencing the leveling of back and leg pain syndromes, as well as the quality of life of patients in the postoperative period [5, 8]. In this aspect, a comprehensive assessment of the quality of life of patients in the postoperative period is one of the main approaches in this direction [5, 7, 8]. Based on this, it is necessary to focus on the increasing joint influence of

the characteristics of the course and severity of the underlying and concomitant pathologies, age, lifestyle and activities of patients.

The aim of the study was to conduct a comparative analysis of the quality of life of patients up to 12 months after microsurgical treatment of lumbar compressive radiculopathy.

MATERIAL AND METHODS

A prospective analysis was carried out. The study was based on the results of treatment of 120 patients with lumbar compressive radiculopathy from January 5, 2020 to November 2021. The main study group consisted of 60 patients (32 men, 28 women), the average age was 43.2 (from 22 to 65) years. The comparison group also consisted of 60 patients (34 men and 26 women), mean age 45.9 years. In the main group, the tubular technique was used, and in the comparison group, the method of discectomy according to W.Caspar. Preoperative assessment of the general condition of patients, as well as subsequent observation and analysis of the results obtained during the study, were systematized and documented at 1, 3, 6, and 12 months after surgery. In particular, regular follow-up calls have been made to patients, and a database has been established to ensure that study subjects are not lost to follow-up. Special Oswestry questionnaires and the SF-36 quality of life scale were used.

When distributing patients in study groups depending on the initial level of functional status impairment (Table 1), most patients had an Oswestry index of more than 40%, and 55.0% (33 out of 60) of cases in the main group and 51 7% (31 out of 60) - in the comparison group. Disability was noted in 23.3% (14 of 60) of cases in the main and 25.0% (15 of 60) in the comparison group, as well as the remaining 20.0% (12 of 60) in the main and 18, 3% (11 out of 60) in the comparison group were bedridden due to severe pain in the back and leg. To document health-related quality of life, we used the short version of the SF-36 questionnaire both before and after surgery. The questionnaire is self-administered and examines 8 aspects of the participant's overall health, including physical functioning, physical roles, bodily pain, general health, vitality, social functioning, emotional roles, and mental health. Higher scores (range, 0-100) reflect better perceptions of health.

Table 1. Distribution of patients depending on the initial index of the Oswestry index upon admission to the hospital

Degree of disability	Main group		Comparison group	
	n	%	n	%
No (0%)	0	0%	0	0%
Minimum (1-20%)	0	0%	0	0%
Moderate (21-40%)	1	11.7 %	3	5.0%
Expressed (41-60%)	33	55.0%	31	51.7%
Disabled (61-80%)	14	23.3%	15	25.0%
Bedridden due to pain (81-100%)	12	20.0 %	11	18.3%
χ^2=4.034; Df=1; p=0.04				

Ethical approval

The review board and ethics committee of Republican Specialized Scientific and Practical Medical Center of Neurology and Stroke approved the study protocol and informed consents were taken from all the participants.

RESULTS AND DISCUSSION

When distributing patients according to the Oswestry index obtained in the long-term (12 months) period, it could be observed that the vast majority of patients were attributed to the degree of absence of any disability - 87.5% (49 of 56 respondents) in the main group and 71 .1 % (37 out of 52 respondents) in the comparison group with a statistically significant difference (χ^2 = 4.509; df =1; P=0.034) in favor of the main group (Table 2). The rest of the patients during the survey noted only minimal limitation of physical and daily (domestic) activity - 12.5% (7 out of 56 respondents) in the main group and 28.2% (15 out of 52 respondents) in the comparison group. When comparing the dynamics of changes in the average values of the Oswestry index (Figure 1), it can be seen that at all stages of the study in both groups there was a significant intragroup decrease in the degree of disability.

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Figure 2 shows that during the initial examination in the preoperative period, the average assessment of the quality of life of patients from the data of the SF-36 questionnaire was equal in the main group to 33±4.6 points for the physical component and 42±5.7 points for the psychological component. There was no statistical difference from the main group in the initial estimates of the quality of life in the comparison group. So, for the physical component, the result was 32±4.8 points and for the psychological component - 42±6.1 points.

Table 2. Distribution of patients depending on the ODI after 12 months

Degree of disability	Main group (n =56)	Comparison group (n=52)
No (0%)	49 (87.5%)	37 (71.1%)
Minimum (1-20%)	7 (12.5%)	15 (28.2%)
Moderate (21-40%)	0	0
Expressed (41-60%)	0	0
Disabled (61-80%)	0	0
Bedridden due to pain (81-100%)	0	0
$\chi^2 = 4.509$; df=1; p=0.034		

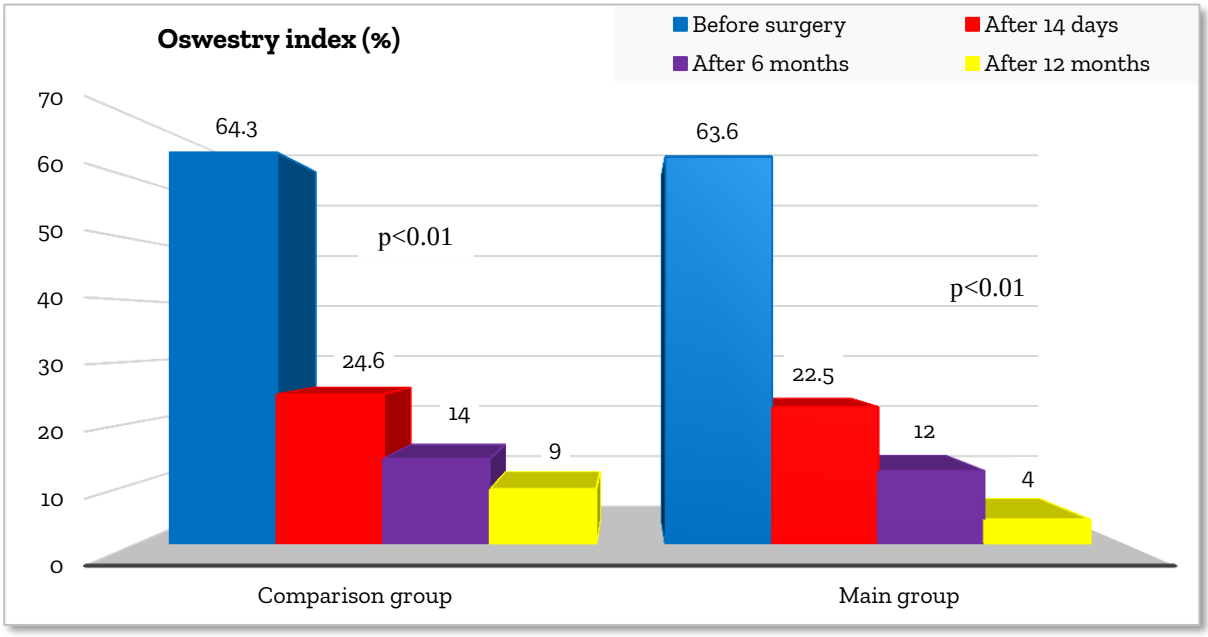

Figure 1. Comparative dynamics of the Oswestry index (%).

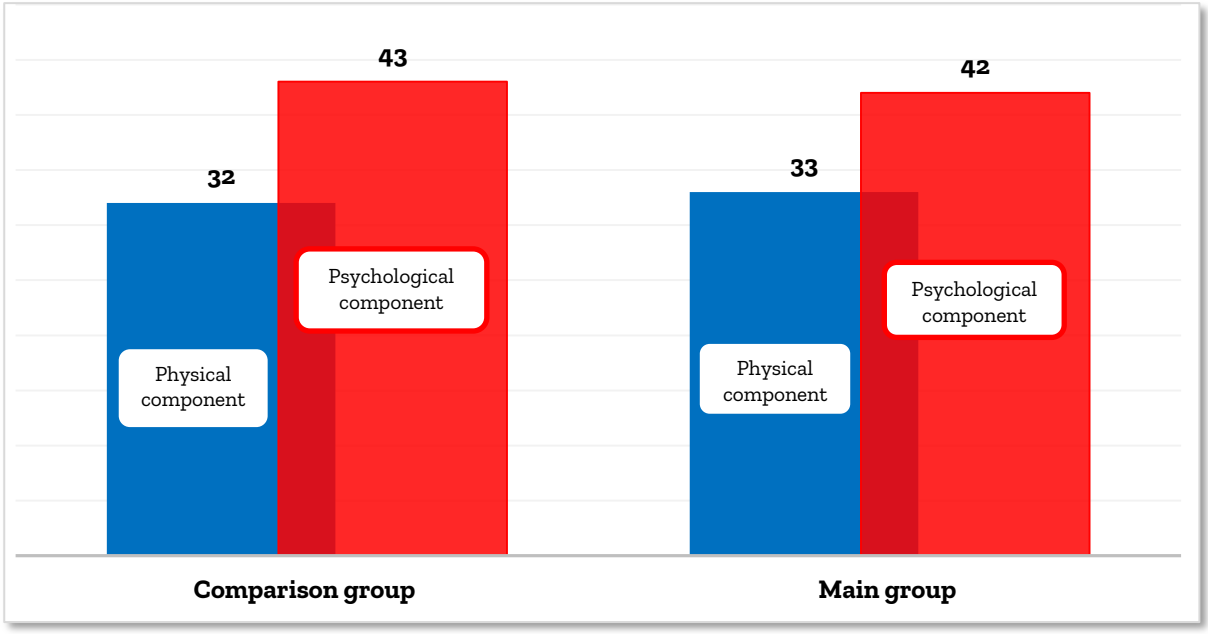

Figure 2. Baseline indicators of quality of life according to SF -36.

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Comparative analysis of baseline values for 8 SF-36 subscales in lumbar compressive radiculopathy (Figure 3) showed the least impact of the disease on physical functioning, vitality, mental health (emotional well-being) and social functioning of patients in both groups without a statistically significant intergroup difference. The largest impact with a set of 0.0% was noted for the subscales role restrictions due to physical problems and role restrictions due to emotional problems (role-emotional). By itself, the assessment of quality of life based on bodily pain (BP) had a range of 30 to 40% (or points), as well as the general perception (state) of health (GH).

As seen from the following tables, the average values for eight subscales in dynamics after surgery increased and approached normal by the end of the study (12 months after surgery) in both groups. At the same time, in the observation period of 3 months after the operation (Table 3), intergroup differences in favor of the main group were obtained in terms of physical well-being (56.5±3.8 versus 44.8±3.9 points in the comparison group), role limitation due to physical health (62.4±4.2 vs. 50.4±4.0 points in the comparison group) and sensation of bodily pain (59.8±4.6 vs. 50.5±5.4 points in comparison group).

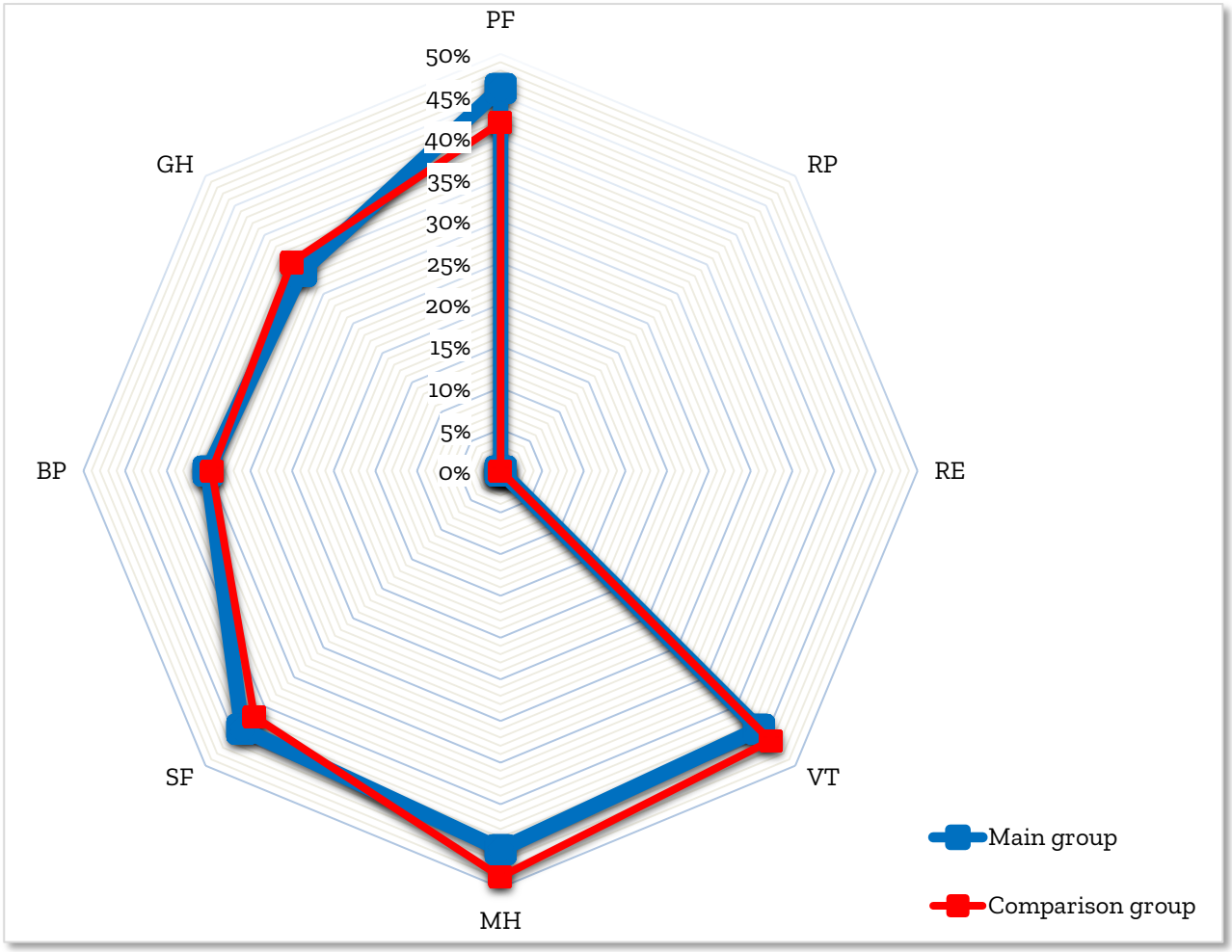

Figure 3. Comparison of baseline values for 8 SF -36 subscales in lumbar compressive radiculopathy

Table 4 shows that the assessment of the quality of life 6 months after surgery showed that for all subscales, the average scores were increased in both study groups and had a statistical intergroup difference both in physical and social functioning, as in indicators of role limitations due to physical health, and because of emotional problems, as well as the difference in pain syndrome.

12 months after surgery, there was no difference in the results of the questionnaire on the pain subscale, physical functioning and role restrictions due to physical health, as well as in the level of vitality. However, limitations of the emotional nature and social well-being remained, which is associated with a longer average rehabilitation period, a higher frequency of relapses of the disease and repeated inpatient examinations and therapeutic measures carried out both at the place of residence of patients and in a specialized center (Table 5).

The dynamics of changes in average indicators of quality of life according to the summary scales SF - 36 can be seen in Figure 4. So, from the diagrams presented, it can be seen that in the main group of patients, the average score on the physical well-being scale was increased from the initial 33±4.6 points to 56±4.6 after 3

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months, which was statistically significantly higher (t = 4.55; P<0.01) than in the comparison group (46.7±4.3 points).

6 months after surgery, the physical component SF - 36 had a higher score in the main group (70.4±3.7) than in the comparison group (64.4±5.3 points; t =2.52; P<0.05). And in a year after surgery, the indicator of the physical component was close to normal values, amounting to 83.2±3.3 points in the main group, and 79.4±4.7 points in the comparison group (t=2.23; P<0.05). Similar dynamics was observed in relation to the average scores for the psychological component and for the overall quality of life (82.6±6.3 versus 78.6±5.4 points;p< 0.05).

Thus, as a result of optimizing the tactical and technical aspects of microsurgical treatment of lumbar compressive radiculopathy, a faster recovery of the general status of the patient was achieved with an increase in the proportion of cases with no functional limitation from 71.1% to 87.5% (according to the Oswestry index), and also improved indicators of long-term dynamics of quality of life scores, both in terms of physical and psychological components of the SF -36 scale (t = 2.44; P<0.05).

Table 3. Quality of life indicators SF-36 "Health Status Survey" in study groups 3 months after surgery (M±δ)

Index	Main group	Comparison group	P value
Physical functioning	56.5±3.8[a]	44.8±3.9[b]	P<0.05
Role restrictions due to physical health	62.4 ±4.2[a]	50.4±4.0[b]	P<0.05
Role restrictions due to emotional issues	60.4±3.2	59.4±3.3	P>0.05
Vital activity	56.4±4.2	55.9±4.6	P>0.05
Emotional well-being	58.6±4.3	57.9±3.6	P>0.05
Social functioning	57.7±3.6	56.7±3.5	P>0.05
Pain	59.8±4.6[a]	50.5±5.4[b]	P<0.05
General health	58.8±4.9	60.1±5.8	P>0.05

Table 4. Quality of life indicators SF-36 "Health Status Survey" in study groups 6 months after surgery (M±δ)

Index	Main group	Comparison group	P value
Physical functioning	75.9±3.8[a]	66.8±3.9[b]	P<0.05
Role restrictions due to physical health	70.4±4.7[a]	63.4±2.7[b]	P<0.05
Role restrictions due to emotional issues	72.2±3.4[a]	64.4±2.3[b]	P<0.05
Vital activity	62.6±4.2	61.2±2.6	P>0.05
Emotional well-being	64.1±2.2	62.9±3.4	P>0.05
Social functioning	73.8±3.6[a]	63.6±3.5[b]	P<0.05
Pain	75.1±4.6[a]	64.4±3.3[b]	P<0.05
General health	73.8±4.9[a]	60.1±4.2[b]	P<0.05

Table 5. Quality of life indicators SF-36 "Health Status Survey" in study groups 12 months after surgery (M±δ)

Index	Main group	Comparison group	P value
Physical functioning	84.2±3.3	81.8±3.4	P>0.05
Role restrictions due to physical health	80.4±2.4	82.2±4.2	P>0.05
Role restrictions due to emotional issues	82.2±4.3[a]	73.0±3.2[b]	P<0.05
Vital activity	73.3±4.2	72.5±2.4	P>0.05
Emotional well-being	75.4±4.3[a]	66.9±3.6[b]	P<0.05
Social functioning	76.6 ±4.4[a]	67.7±3.5[b]	P<0.05
Pain	84.1±4.1	83.3±4.4	P>0.05
General health	83.8±4.9[a]	70.7±4.4[b]	P<0.05

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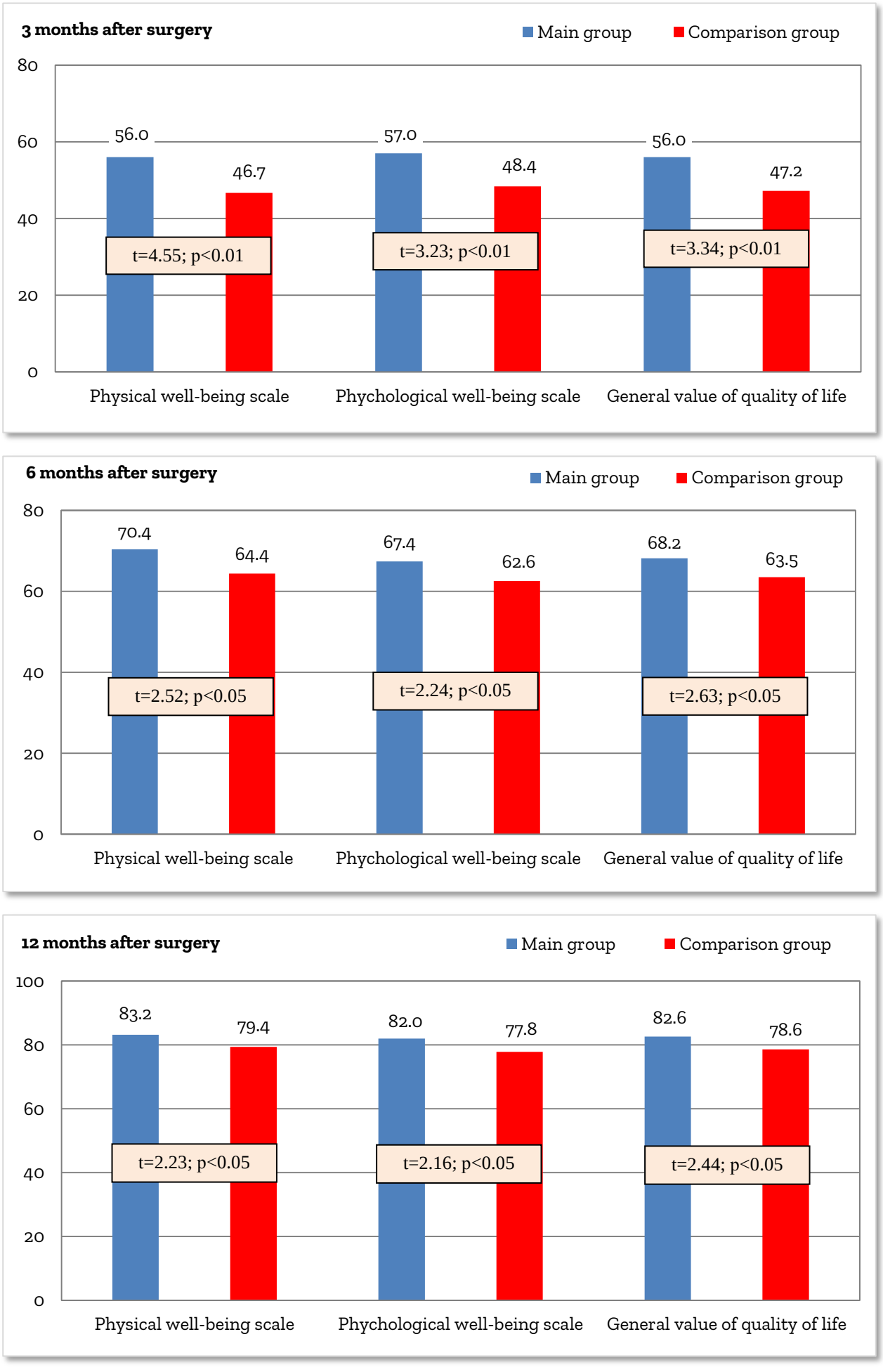

Figure 4. The level of quality of life according to the summary scales of physical and psychological well-being

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DISCUSSION

In the case of radiculopathy, back pain is a prognostically unfavourable sign, negatively affecting the quality of life. A chronic pain syndrome is formed, which delays the recovery prognosis [9]. To date, microdiscectomy is the most studied method of surgical treatment of radiculopathy. This method of microsurgical operation is a minimally invasive intervention when a fragment of intervertebral joints and a disc is removed using an operating microscope with decompression of the spinal root [10, 11, 12]. Microdiscectomy shows an advantage over traditional discectomy; this conclusion comes from the data that in the first case after surgery, analgesia was used in 43% of cases. The second case reached 57% of patients [13]. Lagerbäck et al. [14], citing data that patients with structural malformation, namely sacralization of the 5^{th} lumbar and lumbarization of the 1st sacral vertebra, under the age of 18 years, are at high risk of developing lumbar-sacral radiculopathy. Based on several studies, it can be seen that microdiscectomy in adolescents shows good results, which affects the favourable outcome of treatment and improves the quality of life.

Indicators of reducing pain symptoms, the number of bed days and quality of life, microdiscectomy has advantages over endovideosurgical interventions [15, 16, 17], and we should not forget that the frequency of complications after surgery is lower compared to other types of surgical treatment [18]. Adequately performed surgical decompression of the neurovascular bundle, in case of radiculopathy, helps to eliminate the mechanical compression factor, which plays a significant pathogenetic role in the development of the disease. Performing decompression does not make it possible to eliminate all pathological disorders; based on this, it follows that under certain conditions, any pathological process that has not been destroyed can be activated [12].

The rehabilitation period after microdiscectomy at the lumbar level includes the resolution of such tasks as mobilization of the patient and restoration of motor function in a short time, elimination of pain symptoms, restoration of postoperative changes, improvement of the quality of life of patients, restoration of working capacity, prevention of degenerative processes of the spine [19].

The results of our study determined that the tubular technique of microdiscectomy with flavioplasty in the microsurgical treatment of lumbar compression radiculopathy reduces the risk of postoperative complications, contributing to the early recovery of the functional viability of patients..

CONCLUSION

The implementation of the tubular microdiscectomy technique in patients with lumbar compressive radiculopathy can reduce the hospital and general rehabilitation period, increase the proportion of excellent and good results, and improve the dynamics of physical and psychological indicators of quality of life;

DECLARATIONS

Authors' contributions

Both authors contributed equally in this work.

Ethical approval

The review board and ethics committee of Republican Specialized Scientific and Practical Medical Center of Neurology and Stroke approved the study protocol and informed consents were taken from all the participants.

Funding

Republican Specialized Scientific and Practical Medical Center of Neurology and Stroke.

Availability of data and materials

All data generated or analyzed during this study were included in this published article.

Competing interests

There is no conflict of interest.

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