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Pain and functional disability after lumbar microdiscectomy and their correlations with gender, depression, and recovery expectations

Bol i funkcionalna onesposobljenost posle lumbalne mikrodiskektomije i njihova povezanost sa polom, depresijom i očekivanjima oporavka

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Abstract

Background/Aim. Among the various factors that can influence continued postoperative back pain and/or leg pain, and functional disability after lumbar microdiscectomy are gender, depression, and pessimism. The aim of this study was to determine the correlations between these factors. **Methods.** The research was conducted after microdiscectomy on 198 patients (95 men and 103 women), with a mean age of 50.20 ± 10.26 years. The following questionnaires were used for examinations: for assessment of pain and its intensity and character – PainDETECT Test; for functional disability – Oswestry Low Back Pain Disability Questionnaire; for the presence and degree of depression – Beck Depression Inventory-II; and questionnaire for the assessment of personal expectations (pessimistic/optimistic) about the treatment results. These assessments were carried out after microdiscectomy – just before rehabilitation treatment, one month later, and then 3 and 6 months after a microdiscectomy. **Results.** Depression ($p < 0.01$) and pessimism ($p < 0.01$) had significant negative influences on the pain and functional disability. The subjective sensation of pain was significantly higher in women than in men ($p < 0.01$), while men had a greater degree of functional disability ($p < 0.01$) than women. **Conclusion.** Pain and functional disability of the patients after lumbar microdiscectomy are significantly interconnected with gender, depression, and pessimism. The sensation of pain was higher in women, while men had a greater degree of functional disability. Globally, the intensity of pain and functional disability were significantly greater in patients with a higher degree of depression and pessimism, and, by registering mentioned factors, it is possible to predict the postoperative results.

Key words:
disability evaluation; intervertebral disc displacement; lumbosacral region; neurosurgical procedures; pain; postoperative complications; postoperative period; risk factors.

Apstrakt

Uvod/Cilj. Među raznim činiocima koji mogu uticati na kontinuirani postoperativni bol u leđima i/ili bol u nozi bolesnika nakon lumbalne mikrodiskektomije, kao i na njihovu funkcionalnu onesposobljenost, nalaze se pol i prisustvo depresije i pesimizma. Cilj rada bio je da se utvrdi povezanost između ovih činilaca. **Metode.** Istraživanjem je obuhvaćeno 198 pacijenata (95 muškaraca i 103 žena), prosečne starosti 50,20 ± 10,26 godina, kojima je urađena mikrodiskektomija. Za ispitivanja su korišćeni sledeći upitnici: Upitnik za procenu bola i njegovog intenziteta i karaktera – *PainDETECT Test*; Upitnik za funkcionalnu onesposobljenost – *Oswestry Low Back Pain Disability Questionnaire*; Upitnik za prisustvo i stepen depresije – Bekova skala depresije II; Upitnik za procenu ličnih očekivanja (pesimističnih/optimističnih) rezultata tretmana. Ispitivanja su izvedena nakon mikrodiskektomije u terminima: neposredno pre rehabilitacionog tretmana, mesec dana kasnije, a zatim tri i šest meseci nakon mikrodiskektomije. **Rezultati.** Značajne negativne uticaje na bol i funkcionalnu onesposobljenost imali su depresija ($p < 0,01$) i pesimizam ($p < 0,01$). Subjektivni osećaj bola bio je veći kod žena nego kod muškaraca ($p < 0,01$), dok su muškarci imali veći stepen funkcionalne onesposobljenosti nego žene ($p < 0,01$). **Zaključak.** Bol i funkcionalna onesposobljenost bolesnika nakon lumbalne mikrodiskektomije su značajno uzajamno povezani sa polom, depresijom i pesimizmom. Senzacija bola bila je veća kod žena, dok su muškarci imali viši stepen funkcionalne onesposobljenosti. Globalno, intenzitet bola i

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funkcionalna onesposobljenost su značajno veći kod bolesnika sa višim stepenom depresije i pesimizma i njihovim registrovanjem je moguće predvideti postoperativne terapijske rezultate.

Ključne reči:
sposobnost, ocena; hernija diskusa; lumbosakralni predeo; neurohirurške procedure; bol; postoperativne komplikacije; postoperativni period; faktori rizika.

Introduction

Microdiscectomy is one of the modern surgical methods for treating low back pain (LBP) and radiculopathy caused by a herniated intervertebral lumbar disc.

Continued postoperative back pain and/or leg pain after lumbar decompression back surgery interventions is commonly called failed back surgery syndrome (FBSS). However, there are other terms for the same disorder, such as postlumbar surgery syndrome, failed back syndrome, persistent postoperative syndrome, etc. [1, 2]. Patients with FBSS describe persistent back, back/leg, or leg pain, with functional insufficiency, with or without sciatica, in 10–40% of cases after all spinal surgeries [3–5]. FBSS is a chronic disorder that has a huge impact on the patients, their disability and quality of life, and health care systems. FBSS can be caused by various mechanical, biological, psychological, and social factors [3, 4]. They were the subject of a number of investigations that often confirmed the mutual interconnectivity of these factors. Among these factors, Bordoni and Marelli [3] and Epker and Black [5] found that psychosocial factors such as depression, poor coping, anxiety, somatization, and hypochondriasis have been associated with the development of FBSS.

Moreover, other authors confirmed that intense and long-lasting pain, particularly neuropathic pain, can cause functional disability associated with various psychological disorders such as fear, anxiety, depression, pessimism, and fear/avoidance beliefs of physical activity, work, quality of life, and social problems [6–11].

FBSS may be associated with severe pain, disability, and higher depression scores. Therefore, this group of patients should be subjected to a clinical examination, evaluated psychiatrically, and treated using a multidisciplinary approach, including surgical interventions, rehabilitation, and, if necessary, psychotherapy [4, 5, 8].

Male gender is also among other risk factors for FBSS and poor recovery, which may be associated with heavy physical work and more intensive smoking in this population [10].

Using the appropriate questionnaires and registering mentioned factors, it is possible to predict the functional recovery and, if necessary, implement additional diagnostic and therapeutic procedures in time to improve the postoperative results [11].

The aim of the study was to find the presence of FBSS and functional disability in our patients after lumbar microdiscectomy and determine their association with gender, depression, and negative attitudes and beliefs, i.e., the pessimism of patients about their recovery.

Methods

The research was conducted on 198 patients (95 men and 103 women), of various professions and with a mean age of 50.20 ± 10.26 years (range 29–69 years). The study involved patients who had undergone surgical treatment of disc herniation by lumbar microdiscectomy, transferred from the Clinic for Neurosurgery to the Medical Rehabilitation Clinic at the University Clinical Center of Vojvodina, Novi Sad, Serbia, in order to perform physical therapy and rehabilitation. People with diabetes mellitus, cerebrovascular insult, and alcohol addiction were not included in the study. Patients received standard physical therapy, adjusted exercises, and instructions on correct posture and ergonomic principles in daily activities.

The examinations were in concordance with the Helsinki Declaration and with the approval of the local Ethics Committee, from April 05, 2011 (00-01/171). The patients gave their written consent before entering the research.

The following questionnaires were used for the examinations: PainDETECT Test for assessment of pain and its intensity and character; Oswestry Low Back Pain Disability Questionnaire for functional disability; Beck Depression Inventory-II (BDI-II) for the presence and severity of depression; and Questionnaire for the Assessment of Personal Opinions of the patients (pessimism and optimism) about the results and the degree of own recovery after surgery. Numeric Pain Rating Scale (NPRS) was used for a pain assessment.

These assessments were carried out after microdiscectomy – just before the rehabilitation treatment, one month later, and then 3 and 6 months after a microdiscectomy.

As indicators of basic data in a statistical analysis, the following terms were used: arithmetic mean, median, mode, mode frequency, minimum and maximum values, standard deviation, and confidence interval. In addition to standard statistical methods and Student's t-test, techniques of mixed model ANOVA with the use of software package STATISTICS 12, serial number AXA 302C271408AR-B, were used. Values of $p < 0.05$ were regarded as statistically significant, and $p < 0.01$ as statistically highly significant.

Results

The number, gender, and age of the examined patients are shown in Table 1.

The mean age of examined persons was 50.2 years, without significant differences between men and women.

Table 1

Baseline characteristics of the study patients after microdiscectomy

Parameter	Mean	Median	Mode	Mode frequency	Min	Max	SD
Patients (n = 198)	50.2	52.0	45	20	29	69	10.26
women (n = 103)	49.2	50.5	45	18	29	69	8.95
men (n = 95)	51.3	52.0	54	12	29	68	11.46

All values refer to the age of patients.
SD – standard deviation.

The current pain intensity in the monitored periods

Current intensities of pain expressed by the NPRS with a range from 0 to 10, estimated at the start and after 1, 3, and 6 months, are shown in Table 2.

The decrease in pain intensity during the observed period, compared with the value at the start, was highly significant ($p < 0.01$), as can be seen in Table 2.

The presence of pain and its neuropathic component was evaluated by Pain DETECT Test. According to the score results, the patients with pain were divided into three categories: a neuropathic pain component is unlikely (probability less than 15%); the result is ambiguous, but a neuropathic pain component can be present; a neuropathic pain component is likely (probability greater than 90%).

The results during the examined period are shown in Table 3.

After relocating patients from the Clinic for Neurosurgery to the Medical Rehabilitation Clinic (0th month), all 198 (100%) patients had pain. Among them, 125 (63.1%) patients had ambiguous results (possible neuropathic pain) and 73 (36.9%) had likely neuropathic pain (probability greater than 90%). After three months, the pain was present in 15 (7.6%) patients, of whom only 1 (6.7%) was with neuropathic pain. After 6 months, only 8 (4.0%) patients had pain, but none of them had neuropathic pain. These results can be seen in Table 3.

Table 2

The current pain intensity in the monitored periods

Monitored periods	Mean	Median	Mode	Mode frequency	Min	Max	SD	*p*	95% CI
At the start	4.64	5	5	79	3	7	0.90	-	4.52–4.77
1 month	2.69	3	3	93	2	4	0.67	< 0.01	2.60–2.79
3 months	1.79	2	1	90	1	3	0.81	< 0.01	1.68–1.90
6 months	0.95	1	0	80	0	3	0.91	< 0.01	0.83–1.08

SD – standard deviation; CI – confidence interval.

Table 3

The presence of pain, its character, and neuropathic components in patients (n = 198) during the examined period

Parameters	Patients, n (%)
0th month (at the start)	
present pain	198 (100.0)
unlikely neuropathic pain	0 (0)
ambiguous result	125 (63.1)
likely neuropathic pain	73 (36.9)
1st month	
present pain	39 (19.7)
unlikely neuropathic pain	16 (41.0)
ambiguous result	20 (51.3)
likely neuropathic pain	3 (7.7)
3rd month	
present pain	15 (7.6)
unlikely neuropathic pain	10 (66.7)
ambiguous result	4 (26.7)
likely neuropathic pain	1 (6.7)
6th month	
present pain	8 (4.0)
unlikely neuropathic pain	7 (87.5)
ambiguous result	1 (12.5)
likely neuropathic pain	0 (0.0)

Functional disability during the examined period

The values of functional disability expressed by the Oswestry Disability Index (ODI) are shown in Table 4.

Mean ODI values during the testing period were highly significantly decreased after microdiscectomy ($p < 0.01$) compared with the value at the start (Table 4).

Depression during the examined period

The degree of depression was assessed by the BDI-II scale and their values during the study period are shown in Table 5. BDI-II values during the period of the research were significantly decreased compared with the values at the start. The score up to 20 of the Beck scale indicated practically a state without depression or with low depression, a score of 21 to 30 pointed to moderate depression, and a score above 30 marked the presence of clinically severe depression.

Over time, the numbers and percentages of patients with low, moderate, and high levels of depression changed. During the testing period, the number of patients with moderate and high levels of depression gradually decreased (Table 6).

The intensity of the pain in men and women

Current pain intensity, expressed by NPRS, was registered among women and men at the beginning of physical therapy (0th month), then after 1 month, and 3 and 6 months after a microdiscectomy. The results are shown in Figure 1.

Global reduction of pain intensity in the 1st, 3rd, and 6th month was very significant compared to the initial state, but the pain was more intensive in women than in men all the time.

Functional disability in men and women

Results of the Oswestry Disability Questionnaire expressed as ODI for men and women during the examined period are shown in Figure 2.

Global ODI values significantly decreased over time, but all ODI values during the monitored period were lower in women than in men, as can be seen in Figure 2.

The degree of depression and the intensity of the current pain

Classification of the degree of depression in the appropriate class was performed according to the values score of the Beck scale (BDI-II). In each of these classes of depression, the current pain intensity was evaluated using the Numerical Rating Scale at a certain time (at the beginning, in the 1st, 3rd, and 6th month). The interconnections between depression and the intensity of current pain in the observed periods are shown in Figure 3.

Patients with clinically severe depression had the greatest intensity of pain in all periods of examination; people with moderate depression had lower pain; pain intensity was the lowest among those who had mild, i.e., minimal depression (Figure 3). Anyway, the intensity of pain during the study period was significantly reduced globally in all groups ($p < 0.01$).

Table 4

Oswestry Disability Index (ODI) values during the observed period

Periods of testing	Mean	Median	Mode	Mode frequency	Min–Max	SD	*p*	95% CI
At the start	50.40	51	60	20	26–78	10.29	-	48.97–51.83
1 month	40.05	38	36	30	22–76	8.91	< 0.01	38.81–41.29
3 months	33.07	32	32	29	20–64	7.77	< 0.01	31.99–34.16
6 months	26.74	26	24	40	14–48	7.23	< 0.01	25.73–27.75

SD – standard deviation; CI – confidence interval.

Table 5

Beck Depression Inventory (BDI-II) values in the investigated periods

Time of examination	Mean	Median	SD	*p*	95% CI
At the start	20.95	19	6.93	-	19.99–21.92
1 month	17.04	15	6.46	<0.01	16.14–14.97
3 months	13.58	12	5.69	<0.01	12.79–14.37
6 months	10.83	9	5.75	<0.01	10.03–11.63

SD – standard deviation; CI – confidence interval.

Table 6

Degree of depression among the patients during investigated periods

Degree of depression	Time intervals			
	at beginning	1 month	3 months	6 months
Low	113 (57.1)	141 (71.2)	175 (88.4)	179 (90.5)
Moderate	64 (32.3)	51 (25.8)	21 (10.6)	18 (9.0)
High	21 (10.6)	6 (3.0)	2 (1.0)	1 (0.5)

Results are shown as numbers (%) of patients.

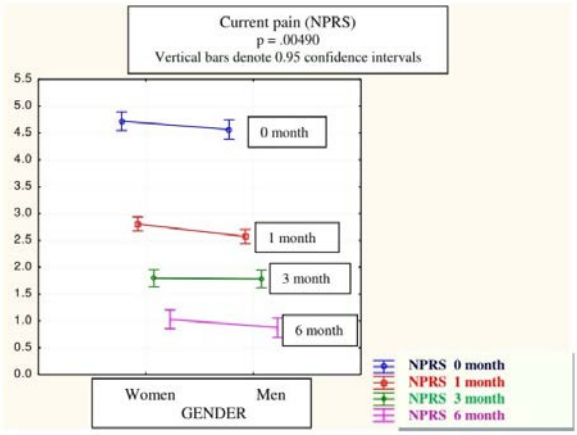

Fig. 1 – Current pain intensity in men and women in the observed periods. NPRS – Numeric Pain Rating Scale.

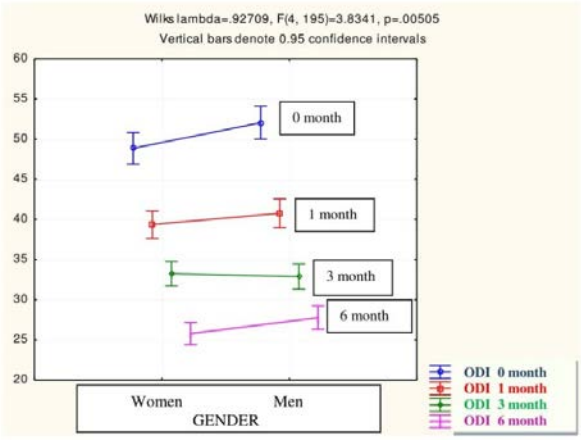

Fig. 2 – Results of Oswestry Disability Index (ODI) for men and women during the examined periods.

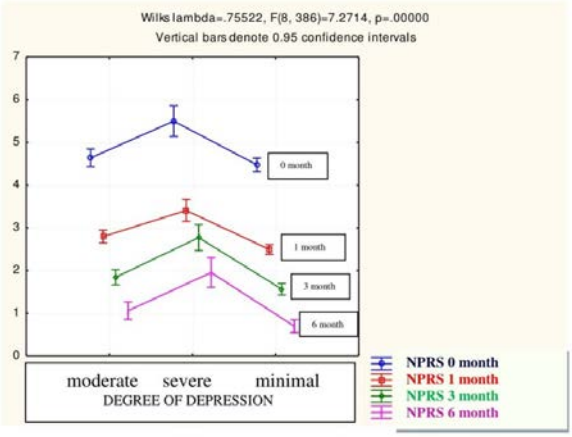

Fig. 3 – The degree of depression and intensity of the current pain in the observed periods. NPRS – Numeric Pain Rating Scale.

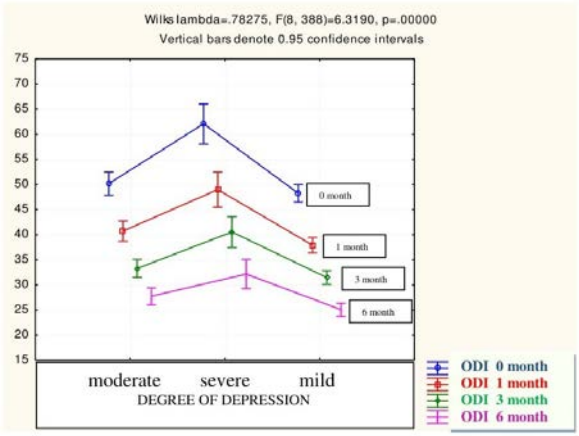

Fig. 4 – The degree of depression and functional disability. ODI – Oswestry Disability Index.

Depression and functional disability

The impact of depression on functional disability is shown in Figure 4. The degree of depression was estimated with BDI-II and the degree of functional disability by using ODI.

The results in Figure 4 show that patients with clinically severe depression had the highest degree of functional disability, those with moderate depression had a lower degree of disability, and the lowest disability showed patients who were practically without depression. The difference between these results was statistically highly significant ($p < 0.01$).

The patient's expectations of the recovery (optimism/pessimism) and the intensity of pain

According to the expectations of patients concerning their recovery after a surgical procedure and performed physical therapy, patients were classified into groups in which then, during the examined period, the intensity of the current pain was estimated. This classification into groups was carried out according to the following patient's expectations of recovery: totally, mainly, partly, a little, I don't know. This classification also showed the degree of optimism or pessimism in the investigated patients.

The link between expectations, i.e., the degree of optimism and pessimism of the patients about their recovery, with the pain intensity after the operation in the monitored period, are shown in Figure 5.

As can be seen in Figure 5, during the postoperative monitoring, the lowest pain intensity was present in patients who were optimistically oriented and expected that treatment would be successful and that they would be totally recovered. On the other hand, greater pain intensity was present in the groups of patients who expected partial or just a little improvement in their health and functional status and patients whose expectations were undetermined.

Expectations regarding the recovery and the degree of disability of patients

The relation of expectations, i.e., the degree of optimism and pessimism of the patients about their recovery, with the ability/disability estimated by ODI after the operation in the monitored period, are shown in Figure 6.

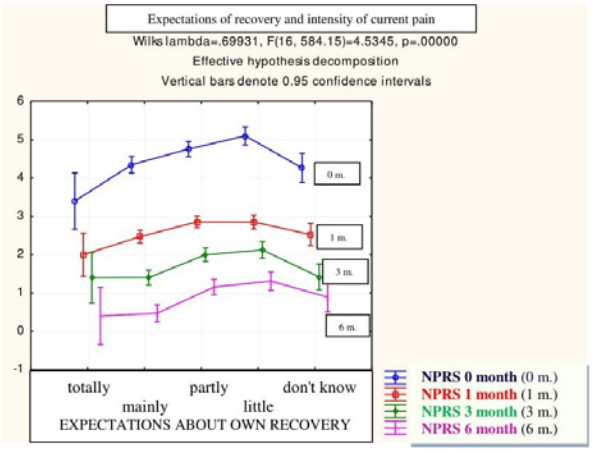

Fig. 5 – Expectations of patients about their recovery and the intensity of pain. NPRS – Numeric pain rating scale.

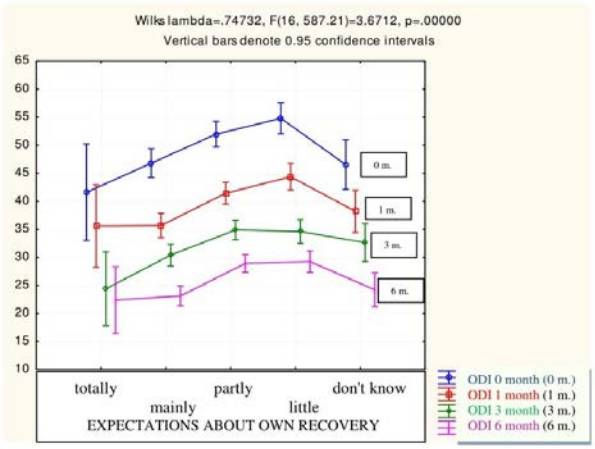

Fig. 6 – The expectations of the patients and the degree of disability. ODI – Oswestry Disability Index.

During the postoperative monitoring, patients who had the lowest ODI were optimistically oriented and expected that treatment would be successful, i.e., that they would be totally recovered. On the other hand, the groups of patients with the greatest disability were those who expected partial or just a little improvement in their health and functional status (Figure 6).

Discussion

FBSS is characterized by persistent back and/or leg pain, with functional insufficiency, after back surgery [1–5].

Chronic pain has a negative impact on the psychological and emotional state, functionality, and quality of life [12–14]. On the other hand, negative emotions and psychological disorders have reverse effects and can increase the intensity of pain perceptions and disability. Mentioned factors in chronic LBP are essentially mutually widely connected and have an interactive relationship. Therefore, these factors should be registered in the diagnostic and included in the treatment procedures because it will enable better success in treatment and faster functional recovery [12–14].

According to published data, patients describe FBSS with persistent uncontrolled back, back/leg, or leg pain, with or without sciatica, with a wide incidence ranging from 10–40% [3–5]. In our study, in the first month of examinations, 39 (19.7%) patients had pain.

For assessing the intensity and character of pain in our study, the PainDETECT questionnaire, simple and proven valuable in practice, was used [15]. The results of this test have shown that during the follow-up period, the number of patients with pain and the number of those with neuropathic or potentially neuropathic pain significantly decreased. These reductions in pain are useful because people with neuropathic pain show higher ratings of pain intensity, depression, anxiety, and functional disability [15, 16].

In our patients, the pain intensity and functional disability were significantly reduced in all subjects during the test period compared with baseline values. However, women constantly had a higher pain intensity than men, while men had a significantly greater degree of functional disability. This could be explained by the presence of greater emotional sensitivity in women and higher mechanical and physical workload of the spine in men due to the nature of their job.

Furthermore, Shi et al. [10] found that FBSS was more common in men than women. They concluded that besides hard physical work, smoking and the duration of preoperative symptoms also significantly influenced clinical outcomes.

Among the various psychological factors, negative influences on postoperative recovery may have depression and pessimism [17–20]. In addition, anxiety, fear, and avoidance beliefs may have similarly negative influences [18, 19].

Most of the research emphasizes the psychological factors and their impact on pain, postoperative recovery, and functionality after a microdiscectomy. However, there are also reversed attitudes implying that the pain reduction after microdiscectomy is the primary and the most important factor that decreases the negative psychological attitudes [19, 20]. For instance, microdiscectomy and nerve decompression reduce pain-associated depression and improve mental well-being and functional status in patients with herniated lumbar disc [19, 20].

Such results were also in the examination of our patients, and the level of depression and functional disability also decreased with the reduction of pain intensity.

Lurie et al. [21], among important psychological and predictive factors, mentioned the patient's positive expectations and optimism for the achievement of better recovery after spinal surgery. They concluded that high expectations of treatment benefits had clinically significant positive associations with outcomes.

The results of our examination confirmed this attitude because the patients with optimistic expectations of their recovery after microdiscectomy had lower pain intensity and better functional status.

In a systematic review, Dorow et al. [22] found that postsurgical back and leg pain was predominantly associated with depression and disability.

On the other hand, Farzanegan et al. [23] found that lumbar discectomy significantly improved depression and disability in patients with herniated discs and chronic low back pain.

It may be noted that the most acceptable attitude could be that all of the above-mentioned factors are in mutual reciprocal connection and that all together have an influence on the recovery and functionality of patients after a microdiscectomy. These conclusions also suggest the results of our examination since the reduction of pain and improvement of psychological state and functionality of the patients during the examined period were parallel. As the treatment of these conditions is complicated, it requires a multidisciplinary approach in many cases.

Conclusion

The intensity of pain and functional disability are significantly associated with depression and pessimism in the patients after lumbar microdiscectomy. The pain sensation was higher in women, while men had a greater degree of functional disability. By registering mentioned factors, it is possible to predict the recovery of the patients after lumbar microdiscectomy.

The mentioned approaches and procedures deserve attention, as well as their application in future patients from our region who will undergo a microdiscectomy for low back pain treatment. It will be the goal of our future activities.

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Conflict of interest

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