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The quality of life of patients after lumbar microdiscectomy

Квалитет живота болесника после лумбалне микродискектомије

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SUMMARY

Introduction/Objective The quality of life (QL) is a modern concept of observing the outcome of the disease and the success of the therapeutic procedure in all fields of medicine.

The aim was to assess the QL of surgically treated patients with lumbar radiculopathy (LR) at the beginning of treatment and 3 months and 6 months after the initiation of prescribed and applied medical rehabilitation.

Methods The study group included randomized and stratified sample of 50 patients treated with lumbar microdiscectomy (LM). Conservative treatment was carried out using physical therapy procedures, kinetic and ergonomic therapeutic procedures and educational training program in ergonomics were carried out in all patients. To assess the condition of the patients, the QL and the efficacy of the rehabilitation treatment we used two standardized questionnaires, SF 36 and The Oswestry Disability Index (ODI).

Results The lowest values of SF 36 - PCS, SF 36 - MCS and of ODI were recorded at the beginning of the rehabilitation (PCS:28.8; MCS:37.8; ODI:56.1%). The most significant improvement of the scores were observed 3 months after the treatment initiation (PCS:42.8; MCS:45.2; ODI:38.9%). At 6 months of the treatment the scores were slightly higher (PCS:49.2; MCS:52.5; ODI:23.7%) ($p < 0.001$).

Conclusion The QL and the functional status of patients after LM is significantly better after 3 and 6 months in comparison with the beginning of rehabilitation, and the state for 6 months compared to the state for 3 months.

Keywords: lumbar radiculopathy; microdiscectomy; quality of life; SF36; ODI; treatment outcome

САЖЕТАК

Увод/Циљ Квалитет живота (КЖ) представља савремени концепт посматрања исхода обољења и лечења у свим областима медицине.

Циљ је био проценити КЖ оперативно лечених болесника са лумбалном радикулопатијом (ЛРП) на почетку лечења, три и шест месеци после прописане и спроведене медицинске рехабилитације.

Методе рада Обухваћен је рандомизиран и стратификован узорак од 50 болесника лечених лумбалном микродискектомијом (ЛМД). Код свих је спроведен конзервативни третман применом физикалних процедура, кинезитерапијских процедура и ергономске едукације. За процену стања болесника, квалитета живота и ефекта рехабилитационог третмана коришћена су два стандардизована упитника, *SF 36* и *The Oswestry Disability Index (ODI)*.

Резултати Најниже вредности *SF 36 - PCS*, *SF 36 - MCS* и *ODI* забележене су на почетку рехабилитације (*PCS*:28,8; *MCS*:37,8; *ODI*:56,1%), три месеца после забележено је најзначајније побољшање скорова (*PCS*: 42,8; *MCS*: 45,2; *ODI*: 38,9%), а после шест месеци скорови су били мало већи (*PCS*: 49,2; *MCS*: 52,5; *ODI*: 23,7%) ($p < 0,001$).

Закључак КЖ и функционални статус пацијената након ЛМД је значајно бољи после три и шест месеци у односу на почетак рехабилитације, као и на шест месеци у односу на стање после три месеца.

Кључне речи: лумбална радикулопатија; микродискектомија; квалитет живота; СФ36; ОДИ; исход лечења

INTRODUCTION

The main symptom of LR is pain in the lumbo-sacral region with propagation to the lower extremities. The intensity of the neuropathic pain depends on the extent of the local damage and on the individual characteristics of the patient and experiential pain perception [1].

Healthy functioning and the QL of patients with LR depends on the severity of the disease, the intensity of the symptoms and on the degree of incapacity. It has been also largely dependent on the applied therapeutic methods and protocols. In addition, the socio-economic implication [2] plays the relevant role. QL provides valuable information about functional ability, level and quality of social interaction, mental state, somatic sensations and satisfaction with life, reflecting the definition of health by the World Health Organization and reflecting the previous scientific data about the impact of the disease and treatment on disability and daily functioning [3].

Questionnaires, as instruments for measuring the QL, regarding to their structure may be general (generic) questionnaires that are structured to express the extent of injury from the standpoint of patients, and questionnaires specific for the disease that are directed to a specific disease. The last ones are formed with an aim to provide a higher sensitivity and specificity [4]. The choice of instrument should be determined by clinician, according to clinical problem and measuring characteristics of the instrument [5].

The aim of this study was to evaluate the QL of the patients immediately after lumbar microdiscectomy (LM) at the beginning of the rehabilitation, and then after 3 months and after 6 months of the prescribed supervised regular physical rehabilitation treatment. For the evaluation, we utilized both general questionnaire and the questionnaire specific for lumbar pain syndrome (LPS).

METHODS

This randomized prospective clinical study included 50 patients with LR of disc genesis who were treated with LM. In all patients, a rehabilitation treatment was carried out under the regular protocol with the use of physical therapy procedures and ergonomic physical training.

Inclusion criteria for the patients in this study were: age between 20 and 65 years; patients of both sexes; orientated in time, space and to other persons, competent to sign an informed consent to participate in the study and with the ability to follow and to adhere to the prescribed treatment regimen and examination, subjects diagnosed with LPS of discogenic etiology (lumbar radiculopathy, lumbar disc herniation) previously operated.

Criteria for non-inclusion of the patients were: patients who do not meet the criteria for inclusion; patients with diagnosed comorbidity that may affect the current nature of the disease and QL; participation in other clinical research; inability to comply with the requirements of the clinical trials for any reason.

A sample of the patients included in the clinical trial was determined by simple randomization and by sorting based on the table of random numbers taken from the regular protocol. The total number of patients in the study period from year of 2014 to 2016 who met the inclusion criteria and entered the selection of research was $n=84$ and the number of patients who met criteria for non-inclusion was $n=8$.

It is important to accentuate that none of the patients who were included in the clinical trial had left the clinical study.

Patients who were involved in the study were interviewed by administering the generic Medical Outcomes Study Short Form 36 (SF-36v2®) and the specific The Oswestry Disability Index (ODI) questionnaires in three specific time periods: at the beginning of the medical rehabilitation (immediately after surgery), three months later and six months after the beginning of the treatment.

SF-36v2® contains 36 questions issues that include 8 fields of QL: physical functioning (PF), the role of physical function (RF), the role of emotional functioning (RE), social functioning (SF),

bodily pain (BP), mental state (MH), vitality (VT), a subjective feeling of health (GH). By further grouping into four areas two summary scores have been obtained: physical (PCS) and mental (MCS). The formula for the calculation of the summary scores included the values of all eight single domains and four basic for each of the summary score (Figure 1 and 2). The Minimum score value was zero and the maximum was 100 – the higher value of the score means the better QL.

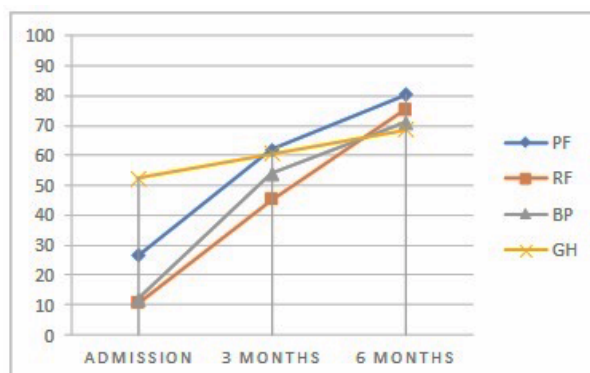


Figure 1. 4 basic domain of PCS change over 6 months after the surgery.

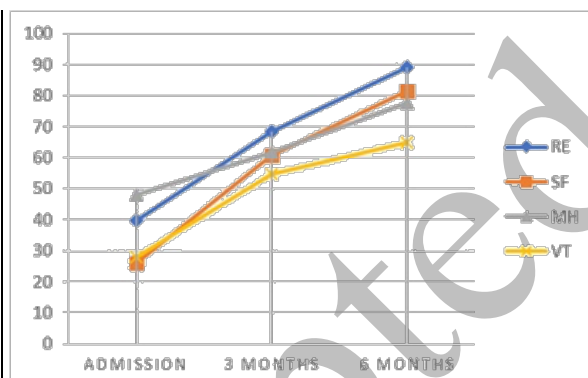


Figure 2. 4 basic domain of MCS change over 6 months after the surgery.

The ODI was generated in ten sections comprising of 6 questions each and answers were ranked by Likert scale. The first area assessed the intensity of pain, while the remaining nine covered disabling effect of pain produced by the typical activity: I - intensity of the pain (PAIN), II - baseline activities of daily living (CARE), III – lifting (LIFT), IV - walking (WALK), V - sitting (SIT), VI - standing (STAND), VII - sleeping (SLEEP), VIII - working (house chore and office work activities (WORK), IX - social life (SOCIAL), and X-travel (TRAVEL). Each subscale was graded from 0 to 5 where higher values represented greater disability. The sum of 10 results was expressed as a percentage of the maximum score (0-100%).

Calculations were performed by using the SPSS program, version 20.0 (IBM SPSS Statistics 20) and Health Outcomes Scoring Software 4.5. which has been the program designed for the entry and statistical processing of statistical data about the QL of patients. Statistical analysis comprised of descriptive and inferential methods (Friedman Test, General Linear Model, Student's T-test, Mann-Whitney U Test, Linear Regression, Spearman's Rank Order Correlation). In all used analysis an alpha of 0.05 is used as the cutoff for significance.

RESULTS

General characteristics of the patients included in the study are shown in Table 1. Of the total number of patient 68% were female and 32% male, mean age 47.12 ± 7.63 .

Disc herniation was most common at the L4-L5 (50%) and at i L5-S1 (46%) and at the L3-L4 level in 4% of the patients only. Most patients (80%) reported the presence of previous episodes of lumbar pain syndrome, while the remaining 20% of patients denied the existence of the previous episodes.

Table 1: General characteristics of the patients (n=50).

Characteristics		Number (%), SD
Gender	Male	16 (32.0)
	Female	34 (68.0)
Age (years)	Mean	47.12±7.63
Education	No primary education	3 (6.0)
	Primary	15 (30.0)
	Secondary/High school	22 (44.0)
	University degree	10 (20.0)
Marital status	Married/in a relationship	38 (76.0)
	Divorced/separated	3 (6.0)
	Widowed	2 (4.0)
	Single	7 (14.0)
Level of discus hernia	L ₃ -L ₄	2 (4.0)
	L ₄ -L ₅	25 (50.0)
	L ₅ -S ₁	23 (46.0)
Earlier episodes	No	10 (20.0)
	Yes, one episodes	11 (22.0)
	Yes, more episodes	29 (58.0)

Table 2: Results of the questionnaire scores of SF-36 and ODI (RM ANOVA).

Questionnaire	Admission	3 months	6 months	F value	p value
SF-36	PCS	28.8	42.8	490.721	<0.001
	MCS	37.8	45.2	72.055	<0.001
ODI	56.10%	38.90%	23.70%	1341.180	<0.001

The results of the assessment of QL obtained by general SF-36V2® questionnaire and the results of the functional capabilities obtained by specific ODI questionnaire in surgically treated patients with LR are shown in Table 2.

At the start of rehabilitation we recorded very low value of PCS 28.8, while the value of the MCS was slightly higher, but also at the low level (37.8). After three months of rehabilitation, value of all scores on the SF-36V2® questionnaire were significantly increased (PCS=42.8;

MCS=45.2), and then after 6 months values approximately reached the levels that charac-

terize the general population (PCS=49.22; MCS=52.5). Analysis of variance for repeated measures (RM ANOVA) showed that the values of PCS (Figure 1) and MCS (Figure 2) scores have significantly changed during the study (F=490.721, p<0.001). Both summary scores showed the greatest registered progress in the first three months from the start of rehabilitation treatment.

Furthermore, after examining the results of the six-month research we found that the domains that participate in the formation of the total PCS and MCS scores and after comparing them with the values given for the general population in different countries, we concluded that the values of the domains moved closer to the general after 6 months of rehabilitation. Compared with the general population of Switzerland, Great Britain, United States and China, a statistically significant difference (p<0.05) was registered among the majority of the domain, except for the two domains: Switzerland (pSF=0.26 i pVT=0.88); United Kingdom (pSF=0,14 i pGH=0.27); United States (pSF=0,35 i pBP=0,08); China (pSF=0,96 i pGH=0,18). When Compared with the general population in Australia a statistically significant difference (p<0.05) was observed in PF, RE, MH, VT and GH domain while in remaining three domains no statistically significant difference was found (pRF=0,16, pSF=0,76, pBP=0,93). The analysis of comparisons of the results of our research with the results in the general population of different countries are shown in Table 3.

Multivariate linear regression analysis showed that the values of PCS and MCS were not significantly related with the monitored characteristics of our patients.

Immediately after surgery we registered the high ODI score of 56.10%, however each following tests recorded significant improvements in the functionality of the patients and after 3 months ODI

Table 3: Comparative overview SF-36 scores with the general population.

	Results of our research			General population				
	I	II	III	a	b	c	d	e
PF	26.5	62	80.3	90.6	85.0	84.2	85.0	83.9
RF	10.5	45	75.2	85.8	81.55	80.9	85.0	77.5
RE	39.8	68.5	89.3	79.2	83.5	81.3	80.2	79.7
SF	26	60.7	81.5	83.7	84.35	83.3	81.4	82.1
BP	11.9	53.8	71	77.6	79.8	75.2	76.6	71.2
MH	48	61.8	77.6	69.2	73.8	74.7	70.6	73.6
VT	28	54.7	64.9	65.1	58.7	60.9	61.7	57.7
GH	52.4	60.62	68.52	76.1	70.35	71.9	66.3	72.8

I – admission; II – 3 months; III – 6 months; a – Switzerland; b – United Kingdom; c – USA; d – China; e – Australia [6].

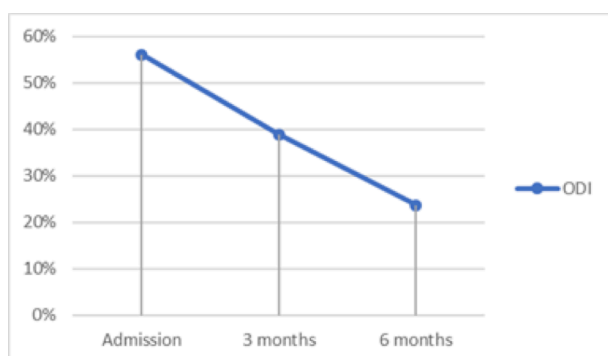


Figure 3. Values of ODI score change over 6 months after the surgery.

Table 4: The mean value of domains ODI score over 6 months after the surgery.

Domains of ODI	Admission	3 months	6 months	χ^2 value	<i>p</i> value
Pain	2.06	1.28	0.52	85.035	<0.001
Care	1.9	1.0	0.46	31.524	<0.001
Lift	4.14	3.4	2.14	66.511	<0.001
Walk	2.76	1.82	0.78	46.587	<0.001
Sit	3.38	2.1	1.38	60.336	<0.001
Stand	3.5	2.46	1.86	51.228	<0.001
Sleep	1.42	1.2	1.0	35.086	<0.001
Work	3.22	2.32	1.04	28.526	<0.001
Social	2.4	2.0	1.7	29.925	<0.001
Travel	3.16	1.9	0.9	40.880	<0.001

χ^2 – Friedman test

lower than the score in the same group of patients with other characteristics relating to the marital status (95%CI 1.798 to 13,044, and $p < 0.05$).

For the purpose of comparison of the assessment of the QL with generic questionnaire (SF-36V2®) and with specific questionnaire for the patients with LR (ODI) we performed the correlation analysis of score values obtained from both questionnaires at all three points of time and for the each particular interview. For the SF-36V2® we used summary scores PCS and MCS, and for the ODI we used PAIN, LIFT, WALK, WORK and SOCIAL. At the beginning of the treatment, the highest recorded value of the correlation was found between PCS and PAIN ($r_s = -0.210$, $p = 0.143$). After three

score was 38.90% and after 6 months of the rehabilitation treatment ODI was decreased to 23.70% (Figure 3).

ODI domain values during six months of follow-up after LM are given in the Table 4. The analysis of the presence of individual

responses in ODI domain Friedman's test revealed statistically significant differences among three measurements ($p < 0.001$). The biggest improvement was registered in the first three months from the beginning of the rehabilitation treatment.

Multivariate linear regression analysis confirmed that the value of the ODI were significantly associated with marital status. In

patients, whose marital status was married or in a common law marriage, after controlling the effects of all other demographic characteristics, the score was greater for 6.452 than the score found in patients with the other marital status (95% PI 1.508 to 11,397, and $p < 0.05$). In operated patients with status “single/never married” the score was for 7,421

months of the rehabilitation, the average value of the correlation coefficient showed better agreement between the selected scores of the selected questionnaire than at beginning of the treatment process, hence emphasizing the need for use of the specific questionnaire for assessing the QL during the rehabilitation treatment. At this survey time period the highest value of the correlation coefficient was observed between the PCS and PAIN ($r_s=-0.251$; $p=0.078$). Six months after the beginning of the rehabilitation, the correlation coefficient values were approximately at the same level as at the second survey time period, wherein the highest value of correlation was between the PCS and PAIN ($r_s=-0.312$, and $p<0.05$).

DISCUSSION

The most important goal of any society should certainly be the health of its population and the improvement of the QL. In regards to this, the research related to the evaluation of the QL in patients affected with one of the most common pathology is gaining the raising importance both in clinical and in population studies. The patient's own report is considered the gold standard for assessing the QL. Doward et al. have compared the reports of experts from different fields relevant to the QL with patients reports and they noted the high degree of correlation. They concluded that the patient report was not only indicator of the patient's subjective experience, but also an objective indicator of the QL in relation to health [7].

In our study participated a total of 50 patients: 34 female and 16 male. In a meta-analysis carried out by Morley et al, the sample comprised of 1672 patients with LPS and the women were also more frequently presented (62%) [8]. In our study the average age of the patients was 47.12 ± 7.63 years and the most patients were in the age ranging from 40 to 59 year old, which is similar to demographic data presented in other researches [9, 10]. These data support the fact that LR affects the working population and that it has been the reason of disability in working population. In regards to educational attainment and marital status the majority of the patients were secondary and elementary educated and married and that was consistent with other studies [11, 12]. The connection of the occurrence of LR with education and marital status has been reflected primarily in the type of occupation and in psychological support of the patient influencing the patient's motivation to accelerate the healing. It was noted that educational attainment has no connection with the development of LR, but it was related to the level of difficulty of the physical work that the patients had performed. Shadbolt concluded that the family was important for the QL, and that respondents who were married and had children had a better general health and physical functioning than those who were married and did not have children and whose characteristic was to having a very strong body pain. Shadbolt also said that people who were not married, manifested a higher degree of social isolation than people who were married. Patients who were not married had a bigger decrease in physical activity that is the important component dimension of the QL [13].

The most important decision in the process of measuring the QL of the patients with LR has been the selection of types of questionnaires that will be used [14]. In the field of rheumatic diseases, the questionnaire SF-36V2® has been proven as the most reliable questionnaire that reflects the QL very realistically and that has a good correlation with the physical and mental capabilities of patients, especially in the patients with LPS treated with different treatment modalities. LPS has been the most common rheumatic disease [14]. The most commonly used generic questionnaire SF-36V2® Health Survey [15] was an instrument in our research. Since the SF-36V2® is not sufficiently sensitive to the changes in QL important for people with LR, there was a need to include the specific instrument that would be focused on domains that were specific for LR and for the characteristics of the patients with LR. The need to include the specific questionnaire for assessing the QL of patients with LR was pointed by Suarez-Almazora et al. [16]: in their research, they indicated that SF-36V2® survey does not reflect the changes in the health status of the patients with LPS adequately. This statement has been notably reflected in our study in neurological symptoms reported by patients.

For the purposes of this study as questionnaire specific to the disease we used ODI, a specific questionnaire for measuring the QL of patients with LR. It has been very practical questionnaire for routine clinical use since it was designed as a multi-dimensional test. It measures the pain and functioning as well as the pain during the activities causing limitations in physical activities, hence it can be classified as a component of serious research.

Values of PCS and MCS showed statistically significant changes during our study. The biggest improvement was recorded after the first three months of the treatment in both summary scores. After six months from the start of rehabilitation, PCS value did not exceed the standard value of the SFS - 50 for the general US population. Lower values of PCS were justified by the severity of the damage and by recent surgery that both contributed to physical limitations in the early postoperative period as well as by applied precautions for wounds, injury to back and reherniation. The patient's fear of physical activity and body movement had contributed to lower PCS values as well. Johansson et al. [17] reported patient's beliefs in recovery and fears of physical activity as leading factors. Authors recommended that the patients with fears of physical activity should be identified and treated appropriately.

We also concluded that the patients with psycho social problems more frequently shortened the time spent at work and in other activities, were less efficient, had less attention and motivation regarding work obligations, were more frequently nervous, in a bad mood, tired, with less energy and less active and more irregular in maintaining social contacts. During the six month follow-up period of patients MCS values showed continuous increase and at the six-month survey period these values exceeded the standard value of a healthy population of the United States - 50. When comparing the results of our research to some other research findings we concluded that there is no agreement that the emotional and psychosocial factors have a major impact on success of the treatment in patients with LR. Johansson et al. [17], Den Boer et al. [18] have noted a more significant psychological

impact in surgical patients when compared with nonsurgical. In contrast to these findings Boskovic et al. [19], Iles et al. [20] after studying the psychosocial factors as predictive factors of the success of treatment in patients with LPS and LR, concluded that depression, satisfaction/ dissatisfaction with work, psychological stress and other factors have a considerably smaller influence and that has been correlated to our research.

Unlike the SF-36V2® survey, in which the questions were referred to the time interval within the previous four weeks, the ODI questions were related to the current status of the patients. The average values of the total score ODI during the examination period were changed significantly in both groups of patients, and the differences of these values three and six months after the surgery were highly statistically significant ($p < 0.001$) in comparison to the values at the beginning.

At the start of the hospitalization (and rehabilitation) and at three months from the start of the rehabilitation, half of the patients responded with: "The pain is very mild at the moment". This fact can be justified by the effect of surgery and by early rehabilitation. After Six months from the beginning of the rehabilitation we concluded that in the majority of the patients (56%) a complete relief of pain was achieved.

The decision that the assessment shall be made after the first three months of the treatment was made because it was thought that that was quite enough long period for the recovery and for the assessment of the therapeutic treatment outcomes. Assessment in the later period (eg, after a year of or more) could provide similar but also different or inadequate results (if eg. for example, there was appearance (emergence) of new herniation of intervertebral discs or other pathological changes of the spine).

The fact that the period of three months after the operation is quite enough long period for the assessment of therapeutic effect and of the degree of recovery was supported by the research carried out by Häkkinen et al. [21]. In their work they estimated compared the score values on ODI questionnaire administered six weeks after the surgery and then one year following the surgery for LR. They proved that the results obtained six weeks after the operation did not change substantially during the coming year.

Ability to function in terms of daily activities that was covered by ODI questionnaire at admission and at the beginning of the treatment process, was limited to light activities. Three months from the start of rehabilitation patients showed an improvement but they were still limited in their daily activities in regards to performance (adjusting) within proper body position. In the last survey period, patients were still on guard, so that their answers ranged from being rigid to avoid harder activities only while lighter activities within the proper body position could be performed and to being able to perform heavier activities but with additional pain. Bakker et al. [22] in the review of prospective cohort studies have confirmed that sitting, walking, long standing in one place, as well as playing sports have not been significant risk factors for the development of LPS and LR, unlike most of the mechanical load of the spine during heavier work have. Bending, torsion of the torso and whole

body vibration were cited as significant predictors [22]. Roffey & Wai with the associates in eight systematic studies [23-30] performed the analysis of the influence of the mechanical factors to the appearance of LPS and LR in a large number of workers in different professions. In these studies, the mechanical factors that were included were: long sitting [23] in an awkward position of the body [24], a long standing and walking [25], lifting and moving patients [26], pushing or pulling [27], bending or twisting of the body [28] lifting of heavier load [29], carrying heavier loads [30].

Low values of correlation coefficients in operated patients and small correlation value of ODI domain SOC (social functioning) with other scores and domains tells about the specifics of this domain and about the evident need to assess the QL of patients with LR by using batteries of generic and specific questionnaires. General generic questionnaire are needed to analyze appropriately the QL of patients in comparison to the normal population and to compare the QL in patients with different diseases, and specific questionnaires are needed in order to assess in detail the health and QL of these patients.

CONCLUSION

Given that the QL includes all aspects of the patient's life in patients who underwent LM, we did not expect an improvement in the first days after the operation. In further monitoring of our patients we recorded significantly higher values of physical functioning and functioning in emotional and social aspect of the QL at 3 months and at 6 months when compared to the beginning of rehabilitation, and at 6 months when compared to 3 months of the rehabilitation.

A statistically significant negative correlation between PCS and PAIN was recorded on the third repeated measurement. Values of domains and scores and the small values of correlation coefficients indicate that this group of patients feels differently after surgery and rehabilitation, and that that observation requires more detailed analysis and the utilization of the battery of the generic and specific questionnaires.

Medical rehabilitation and ergonomic educational training have great importance in the planned structured recovery of patients after LM.

Application of the appropriate questionnaires in the patients with LR has been of great importance in the assessment of the impact of the disease on physical, psychological, functional and work capacity and on the quality of life and in the patients after LM it plays an essential role in the assessment of the efficacy of the rehabilitation treatment and consequently in the planning of the further management of the patients.

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