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REHABILITATION AFTER SURGICAL INTERVENTION ON PATIENTS WITH DISC HERNIATION

Adriatik Jahjaga[1], Adem Hykolli[2], Mitrichka Dzambazovska-Stardelova[3], Georgi Georgiev[4]

Abstract: *Disc herniation is pathologically divided into four stages of herniated nucleus pulposus: 1) bulging, 2) protrusion, 3) extrusion, 4) sequestration. The most important symptom of disc herniation is pain. Patients with symptoms undergoing urgent surgical intervention are 2% of the total. The aim of this study is to establish the efficiency of the physical therapy applied to patients after disc herniation surgery. The research covered 89 patients who had undergone lumbar spine surgery – 47 (or 52,8%) women and 42 (or 47,2%) men. The data was processed through basic descriptive statistical parameters: frequencies and percentage. The non-parametric methods that were applied were the χ^2 test and the Mann-Whitney U test. The following conclusions can be drawn from the obtained data: disc herniation was most often located in L5-S1 in 47,2% of the cases, then in L4-L5 in 46%, and in L3-L4 in 6,7%; in 51,68% of the cases, the disc herniation was located on the right side, and in 48,3% on the left side; the muscle grade before dorsiflexion surgery was 1 in 2,2% of the patients, 2 in 5,6%, 3 in 10,1%, and 4 in 82,0%; the muscle grade after dorsiflexion surgery was 2 in 1,1% of the respondents, 3 in 6,7%, 4+ in 22,5%, and 5 in 69,7%; the muscle grade before plantarflexion surgery was 2 in 5,6% of the respondents, 3 in 7,9%, and 4- in 86,5%; the muscle grade after plantarflexion surgery was 3 in 3,4% of the respondents, 4 in 14,6%, and 5 in 82,0%.*

Keywords: *physiotherapy; post-surgery period; patients of both sexes; female and male respondents*

INTRODUCTION

The space between the spine rings is filled with intervertebral discs, the function of which is to soften mechanical loads that might cause development of degenerative diseases. The intervertebral disc (IV) consists of an outer portion (annulus fibrosis) and inner gel material (nucleus pulposus).

Disc herniation is pathologically divided into four stages of herniated nucleus pulposus: 1) bulging, 2) protrusion, 3) extrusion, 4) sequestration.

The most important factors that provoke the disease are: age, sex, mechanical force, wrong body posture, spine deformity (scoliosis), inherited or acquired abnormalities of the spine and lower extremities, micro-traumatic formations.

[1] **Adriatik Jahjaga –** PhD student at the Faculty of Physical Education, Sport and Health at the “Ss. Cyril and Methodius” University in Skopje, R. N. Macedonia, e-mail: adriatikjahjaga1@gmail.com

[2] **Adem Hykolli –** PhD student at the Faculty of Physical Education, Sport and Health at the “Ss. Cyril and Methodius” University in Skopje, R. N. Macedonia, e-mail: ademhykolli1@gmail.com

[3] **Mitrichka Dzambazovska-Stardelova –** PhD in Kinesiology, Professor at the Faculty of Physical Education, Sport and Health at the “Ss. Cyril and Methodius” University in Skopje, R. N. Macedonia, e-mail: mstardelova@yahoo.com

[4] **Georgi Georgiev –** PhD in Kinesiology, Professor at the Faculty of Physical Education, Sport and Health at the “Ss. Cyril and Methodius” University in Skopje. R. N. Macedonia, e-mail: georgigeorgiev63@yahoo.com

The main symptom of a disc damage is pain in the lumbar region (Hlubek & Mundis, 2017). The pain is harsh, intensive, and it becomes more severe with every movement, coughing, laughing, etc. If the pain subsides during relaxation and does not radiate along the leg, we talk about disc protrusion of the intervertebral disc (Dang & Liu, 2010; Kulikov et al., 2016). If the pain radiates along the leg and is accompanied with disorder of the sensitivity and muscular strength, we talk about a rupture (prolapse) of disc IV.

Disc herniation affects different spine regions (Amin et al., 2017). On the basis of the epidemiological view of the clinical experience with disc herniation, it has been established that 36% of the cases are in the cervical region, 62% in the lumbar, and 2% at the level of the thoracic spine. The lumbar region pain is mostly at the L5-S1 level (45–50%), followed by the L4-L5 level (40–45%), whereas the problems at the L3-L4 level cover only 5%. It is important to emphasize that patients with pains in their back form 93% of the total cases, while those with pains in both back and legs account for only 5%. Patients with symptoms undergoing urgent surgical intervention are 2% of the total (Weinstein et al., 2008; Lurie et al., 2014).

The most important symptom of disc herniation is pain. The patient's information about the initial stage of the pain, its development and their reaction to the pain provides the most important data for diagnosing the problem. The lumbar disc herniation's symptoms progress in a short period of time, where the initial pain more often than not appears all at once or after lifting a heavy load, which is the situation in 60% of the cases. Many of the patients ascribe the pain occurrence to a particular improper movement (Bouthors et al., 2019). The most frequent levels of disc herniation are L5-S1 and L4-L5 (Lübbers et al., 2012).

The main goal of each patient's treatment is to help them in mitigating the pain and other symptoms that arise from the disc herniation disease. In order to achieve the goal, the treatment programme should be adjusted individually to each patient depending on the pain's prime source, severity, and the specific symptoms.

Usually, disc herniation does not require surgical intervention, and many studies have established that, within 12 weeks, 73% of the patients mark a considerable improvement without surgery.

The disc herniation treatment consists of a conservative (non-surgical) treatment and a surgical one. The conservative treatment implements medications and physical therapy. There are some relatively rare situations that require urgent surgery (Amin et al., 2017; Lizis et al., 2017).

The aim of this study is to establish the efficiency of the physical therapy applied to patients after disc herniation surgery. It also aims to present the results of this therapy after application in an early and later post-operative phase, and to show the effects of saving the amplitudes and muscle strength, as well as the total impact in improving the life quality (Bae et al., 2016).

METHODS

The research was conducted at the University Clinical Centre in Prishtina (UKCP) among patients with pains in the back and lumbar region of both sexes. The research was longitudinal as it was held for 10 weeks. After leaving the Department of Neurosurgery at the Clinic of Physical Medicine with Rehabilitation, the patients' treatment continued with rehabilitation. Exercises were carried out five times a day by 5 to 10 repetitions of each.

The data was processed through the basic descriptive statistical parameters of frequencies and percentage. The non-parametric methods that were applied were the χ^2 test and the Mann-Whitney U test.

RESULTS

The research covered 89 patients who had undergone lumbar spine surgery in the Clinic of Neurosurgery at UKCP, and who later went through physical therapy and rehabilitation.

The sample of the research included 89 patients, divided into two subsamples according to their sex: 47 (or 52,8%) women, and 42 (or 47,2%) men. The average age of the female patients was 49 years (between 28 and 75), while that of the male patients was 50 years (between 29 and 76). According to the data, their occupations were: physical work – 36,0%, stay-at-home mothers – 15,7%, bank clerks – 14,6%, economists – 11,2 %, barristers – 8,9%, hairdressers – 3,4%, dentists – 3,4%, physicians – 2,2%, engineers – 2,2%, and teachers – 2,2%.

Table 1. *Condition according to diagnosis and sex*

	Females		Males		Total	
Final diagnosis	N	%	N	%	N	%
Disc herniation i. v L3-L4	4	8.5	2	4.8	6	6.7
Disc herniation i. v L4-L5	22	46.8	19	45.2	41	46.1
Disc herniation i. v L5-S1	21	44.7	21	50.0	42	47.2
Total	47	100.0	42	100.0	89	100.0
χ^2 test = 0.607, P = 0.738						

Disc herniation was most often located in the L5-S1 area in 47,2% of the cases, in L4-L5 in 46,1%, and in L3-L4 in just 6,7% (Table 1). There was no statistically significant difference (χ^2 = 0,607, P = 0,738, namely P > 0,05) according to the distribution of the cases with regard to the disc herniation location and sex.

Table 2. *Condition according to diagnosis and lateralization*

	Lat. Sin.		Lat. Dex.		Total	
Final diagnosis	N	%	N	%	N	%
Disc herniation i. v L3-L4	4	4.5	2	2.2	6	100.0
Disc herniation i. v L4-L5	20	48.8	21	51.2	41	100.0
Disc herniation i. v L5-S1	19	45.2	23	54.8	42	100.0
Total	43	48.3	46	51.6	89	100.0
χ^2 test = 0.280, P = 0.596						

Disc herniation was located on the right side in 51,68% of the cases, and on the left side in 48,3% (Table 2). The disc herniation in L3-L4 was located on the right in 4,5% and on the left in 2,2%, while in L4-L5 and L5-S1 it was located on the right in 51,2% and 54,8% of the cases respectively. Through the χ^2 test, we have not established a difference with statistical significance between the lateralization of disc herniation and the final diagnosis (χ^2 = 0,280, P = 0,596, hence P > 0,05).

Table 3. *Condition (assessment) of the degree of dorsiflexion before and after surgery*

	Before dorsiflexion surgery		After dorsiflexion surgery	
Muscle note	N	%	N	%
1	2	2.2	-	-
2	5	5.6	1	1.1
3	9	10.1	6	6.7
4-	73	82.0	-	-
4+	-	-	20	22.5
5	-	-	62	69.7
Total	89	100.0	89	100.0

After the surgery, a considerable improvement of the muscle tone and dorsiflexion was noted. We have no cases with grade 1 of the muscle condition; cases with grade 2 fell from 5,6% to 1,1%, and with grade 3 from 10,1% to 6,7%; there are no cases with grade 4-; those with grade 4+ were 22,5%, and the ones with grade 5 were 69,7% (Table 3).

Table 4. *Condition (assessment) of the degree of dorsiflexion before and after surgery*

Muscle note	Before dorsiflexion surgery	After dorsiflexion surgery
Medium ± DS	3.2 ± 0.6	4.6 ± 0.7
Rank	1 – 4	2 – 5
Mann-Whitney U test = 5960.5, P = 0.001		

Before the surgery (Table 4), the average grade of the muscle was 3,6 (DS ± 0,6) with a span from 1 to 4. After the surgery, the average muscle grade was 4,6 (DS ± 0,7) with a span from 2 to 5. The difference established through the Mann-Whitney test was statistically significant at the level of the muscles before and after the surgery (U = 5960,5, P = 0,001).

Table 5. *Condition (assessment) of the degree of the plantar flexor muscles before and after surgery*

	Before plantar flexion surgery		After plantar flexion surgery	
Muscle note	N	%	N	%
2	5	5.6	-	-
3	7	7.9	3	3.4
4-	77	86.5	-	-
4	-	-	13	14.6
5	-	-	73	82.0
Total	89	100.0	89	100.0

After the surgery, a visible improvement of the muscle tone was marked. There was no case with muscle grades of 2 and 4-; the cases with grade 3 fell from 7,9% to 3,4%; the cases with grades 4+ and 5 were 14,6% and 82,0% respectively (Table 5).

Table 6. *Parameters of the degree of the plantar flexor muscles before and after surgery*

Muscle note	Before dorsiflexion surgery	After dorsiflexion surgery
Medium ± SD	3.3 ± 0.4	4.9 ± 0.2
Rank	2 - 4	3 - 5
Mann-Whitney U test=5944 P=0.0001		

The average muscle grade before surgery (Table 6) was 3,3 (DS ± 0,4) with a span from 2 to 4. After surgery, the average muscle grade was 4,9 (DS ± 0,2) with a span from 3 to 5. The difference established through the Mann-Whitney test was statistically significant at the muscle level before and after the operation (U = 5944, P = 0,0001).

Table 7. *Presence of pain in the subjects of different sexes*

	Females		Males		Total	
Presence of pain	N	%	N	%	N	%
No	4	8.5	2	4.8	6	6.7
Total	47	100.0	42	100.0	89	100.0

None of the patients reported pain after finishing the physical therapy (Table 7).

Table 8. *Presence of neurological deficit in respondents by sex*

	Females		Males		Total	
Neurological deficit	N	%	N	%	N	%
Yes	1	2.1	1	2.4	2	2.2
No	46	97.9	41	97.6	87	97.8
Total	47	100.0	42	100.0	89	100.0
Fisher test P = 0.969						

After finishing the therapy (Table 8), we established a neurological deficit in 2 or 2,2% of the sampled patients. A neurological deficit was noticed in 2,1% of the women and in 2,4% of the men, which is a difference without a statistical significance (Fisher test P = 0,969).

DISCUSSION

• On the basis of the epidemiological view of the clinical experience with disc herniation, it was established that 36% of the cases were at the cervical level, 62% at the lumbar level, and 2% at the thoracic level. The cases at the lumbar level were mostly located in LS-S1 (45–50%), followed by L4-L5 (40-45%) and L3-L4 (just 5%). In relation to the global data corresponding to that of the current study, disc herniation has been located mainly in L5-S1 in 47,2% of the cases, followed by L4-L5 in 46,1%, and finally L3-L4 in 6,7%.

• As for the risk factors leading to disc herniation (Gugliotta, 2016; Benzakour et al., 2019; Kanno et al., 2019), there are numbers of them, but some of the dominant ones are occupation and psychological stress (Shoenfield & Weiner, 2010; Albert, 2019; Ahsan et al., 2021). In this study, with regard to professional occupation, disc herniation dominates in physical workers who were 36,0%.

• Muscle strength was estimated with grades. Thus, the average muscle strength before surgery was significantly weaker than that after surgery. The muscle grade before surgery was 1 in 2,2% of the respondents, 2 and later 10 in 5,6%, 3 in 1%, and 4- in 82,0%. The muscle grade after dorsiflexion surgery was 2 in 1,1% of the respondents, 3 in 6,7%, 4+ in 22,5%, and 5 in 69,7%.

• The muscle grade before plantarflexion surgery was 2 in 5,6% of the respondents, 3 in 7,9%, 4 in 14,6%, and 5 in 82,0%.

• Most of the patients had pain around the sciatic area. That type of disc herniation can result in muscle weakness, numbness, and the pain can go down the leg to the foot and the outer side of the foot. The presence of pain and neurological deficit marked in the current study also correspond to the bibliography data.

CONCLUSION

On the basis of the results presented in the study, the following conclusions can be drawn:

• Out of 89 patients tested in the study, 47 or 52,8% were women, and 42 or 47,2% were men.

• The average age of the respondents was 49,4 years (DS ± 12,6 years).

• Most of the patients with disc herniation were physical workers (36,0%), followed by stay-at-home mothers (28,1%), bank clerks (12,4%), economists (7,9%), barristers (5,6%), hairdressers (3,4%), physicians (2,2%), engineers (2,2%), teachers (1,1%), and dentists (1,1%).

• Disc herniation was most often located in L5-S1 (47,2% of the cases), followed by L4-L5 (46%) and L3-L4 (6,7%).
• In 51,68% of the cases, the disc herniation was located on the right side, and in 48,3% on the left side.
• The muscle grade before dorsiflexion surgery was 1 in 2,2% of the patients, 2 in 5,6%, 3 in 10,1%, and 4 in 82,0%.
• The muscle grade after dorsiflexion surgery was 2 in 1,1% of the respondents, 3 in 6,7%, 4+ in 22,5%, and 5 in 69,7%.
• The muscle grade before plantarflexion surgery was 2 in 5,6% of the respondents, 3 in 7,9%, and 4- in 86,5%.
• The muscle grade after plantarflexion surgery was 3 in 3,4% of the respondents, 4 in 14,6%, and 5 in 82,0%.

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