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The Effect Of Corset On Postoperative Pain Following Lumbar Disc Herniations

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Keywords
Lumbar disc hernia, Corset, Microdiscectomy, Visual analog scale, Oswestry disability index

In this research, we aimed to investigate the effect of lumbar corsets on the postoperative pain of single and multiple-level lumbar disc herniations by the Visual analog scale (VAS) and the health outcomes via the Oswestry Disability Index (ODI). Patients (n=101) with a single or double-level unilateral lumbar disc hernia with no history of lumbar surgery were included in this study. All patients decided for operation have been administered non-steroidal NSAIDs and muscle relaxants for 4 – 6 weeks before the operation. All patients were recommended to use a lumbar corset in the postoperative period. A VAS and ODI were utilized to measure the clinical outcomes of corset usage. The first-week and first-month average VAS scores in the corsets group were statistically significantly lower than those who did not use corsets ($p<0.001$, $p=0.002$). No statistically significant difference was found in the first-week and first-month VAS changes of the patients who did not use corsets ($p=0.059$). The first-week and first-month average ODI scores in the corsets group were statistically significantly lower than those who did not use ($p=0.012$, $p<0.001$). The change in ODI scores from the first week to the first month was statistically significantly higher in patients wearing corsets ($p<0.001$). Early adoption of the corset in the postoperative period can help rest and promote the dynamic healing of aching back muscles. Our findings indicated that the use of corsets promoted early recovery from rehabilitation and returns to daily activities.

Lomber Disk Hernisinde Postoperatif Ağrılarda Korsenin Etkisi

Anahtar Kelimeler
Lomber disk hernisi, Korse, Mikrodiskektomi, Vizüel analog skalası, Oswestry disabilite indeksi

Bu araştırmada, tek ve çok seviyeli lomber disk hernilerinde bel korselerinin postoperatif ağrı üzerine etkisini Visual analog skala (VAS) ile ve Oswestry Disabilite İndeksi (ODI) ile sağlık sonuçlarına etkisini araştırmayı amaçladık. Bu çalışmaya lomber cerrahi öyküsü olmayan, tek veya çift seviyeli unilateral lomber disk hernisi olan hastalar (n=101) dahil edildi. Operasyona karar verilen tüm hastalara operasyondan 4 – 6 hafta önce non-steroidal NSAİİ ve kas gevşetici verildi. Tüm hastalara postoperatif dönemde lomber korse kullanmaları önerildi. Korse kullanımının klinik sonuçlarını ölçmek için bir VAS ve ODI kullanıldı. Korse grubunda 1. hafta ve 1. ay ortalama VAS skorları korse kullanmayanlara göre istatistiksel olarak anlamlı derecede düşüktü ($p<0.001$, $p=0.002$). Korse kullanmayan hastaların 1. hafta ve 1. ay VAS değişimlerinde istatistiksel olarak anlamlı fark bulunmadı ($p=0.059$). Korse grubunda 1. hafta ve 1. ay ortalama ODI skorları kullanmayanlara göre istatistiksel olarak anlamlı derecede düşüktü ($p=0.012$, $p<0.001$). ODI puanlarının birinci haftadan birinci aya göre değişimi korse kullanan hastalarda istatistiksel olarak anlamlı derecede yüksekti ($p<0,001$). Postoperatif dönemde korsenin erken dönemde benimsenmesi, dinlenmeye yardımcı olabilir ve ağrıyan sırt kaslarının dinamik iyileşmesini destekleyebilir. Bulgularımız, korse kullanımının rehabilitasyondan erken iyileşmeyi ve günlük aktivitelere dönüşü desteklediğini göstermiştir.

1. INTRODUCTION

Lombar back pain is one of the most common musculoskeletal problems today. Approximately 70 – 85% of the adult population suffers from low back pain at some point in their lives. Low back pain has many causes. One of the most important causes is lumbar disc herniation (LDH). LDH is the displacement of material inside the intervertebral disc from the edges of the disc [1]. L4 – L5 and L5 – S1 segments are the most common levels of disc herniation. Typical symptoms are radiating pain, felting sensation, numbness, loss of sensation, loss of muscle strength, and functional limitation caused by all these symptoms [2].

Long-term low back pain causes activity restriction in individuals, causing atrophy, especially in the muscles in the waist region. This atrophy condition causes insufficiency in spinal stabilization activity in individuals. Studies have shown that individuals with chronic low back pain have fatigue in the posterior trunk muscles and weakness in the abdominal muscles [3]. Low back pain and sciatica can bring considerable consequences to human daily life, such as impairment of social and work abilities. Spinal degeneration, trauma, inflammation, and infection can be counted as the source of lumbar back pain [4]. LDH is a kind of spinal degeneration that can lead to sciatica or low back pain. Even if low back pain can be observed more frequently, the annual incidence of LDH can reach 2% [5].

Conservative and surgical methods treat LDH. Surgical methods are preferred in individuals with progressive neurological symptoms or cauda equina syndrome who cannot be successful with conservative methods. Among the surgical methods used, microdiscectomy is accepted as the gold standard for shorter operation time and faster return to working life [6]. The intervertebral disc is the largest aneural tissue in the body, so the pain does not occur due to problems in the disc in the early period. The presence of pain is an important parameter for determining the degree of degeneration, and the reduction of pain is an important parameter for recovery [7].

Almost 70% of patients with LDH experience an outstanding decrease in pain after four weeks of conservative medical treatment. Even though pain reduction can be achieved to 80% with the prolongation of conservative treatment, LDH may end up with surgery [6-8]. The decision of the surgery may be attached to many indefinite factors such as a positive leg raising test and long duration of symptoms. Once the surgery is performed, the fundamental purpose should be reducing the pain, at least in the first postoperative week. Although sciatica can usually decrease or even disappear after surgery, the low back pain may persist for a while and proceed to affect the patient's life [9].

Non-steroid anti-inflammatory drugs (NSAIDs) are preferred in these situations; however, opioids may cause undesirable side effects [10]. Even though they have been claimed not to affect spinal stabilization, lumbar corsets (braces) have been used long to reduce back pain, and indications have been discussed since then [11].
In the present study, we aimed to investigate the effect of lumbar corsets on the postoperative pain of single and multiple-level LDH by using the Visual analog scale (VAS) scores and the health outcomes via the Oswestry Disability Index (ODI) scores.

2. MATERIAL AND METHOD

A total of 101 patients who were operated on for LDH in our institution between June 2019 to July 2022 have been enrolled in this retrospective analysis. All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008. Ethics committee approval has been granted from Istanbul Medeniyet University on 10.05.2023 with protocol number 0308.

Patients with a single or double-level unilateral LDH with no history of lumbar surgery were included in this study. Individuals were diagnosed via MRI. All patients decided for operation have been administered NSAIDs and muscle relaxants for 4 – 6 weeks before the operation. Persistent radiculopathy was the main driver in the surgery decision. The operations were performed by one neurosurgeon with the standard unilateral microdiscectomy procedure. The patients were divided into two groups according to the disc levels operated as single-level or double-level. All patients were recommended to use a lumbar corset in the postoperative period. A VAS was utilized to investigate low back pain in the first week and the first month after the operation. ODI was administered to measure the clinical outcomes of corset usage.

Individuals with other reasons for back pain, such as lumbar stenosis, lumbar listhesis, rheumatic diseases, osteoclasis, or joint inflammation, and patients on antipsychotics or other medication that could affect pain were excluded from the analysis.

2.1. Statistical Analysis

The statistical analysis was conducted using SPSS 15.0 for Windows. Numbers and percentages for categorical variables, and mean, standard deviation, minimum, maximum, and median for numerical variables. The Wilcoxon Test was used to analyze the differences in the dependent group because the normal distribution assumption was not met. The Mann-Whitney U test was used to compare numerical variables between two independent groups because the assumption of normal distribution was unmet. The acceptable significance level for alpha was $p<0.05$.

3. RESULTS

A total of 101 patients who underwent LDH have been enrolled in this research. The mean age of the participants was 49.6±13.3 years (range 22 – 71). There

was no difference regarding gender; 48.5% (n=49) of the patients were female, and 51.5% (n=52) were male. The distribution of herniation was 47.5% (n=48) double level and 52.5% (n=53) single level. Approximately half of the subjects, 46.5% (n=47), wore corsets, while 53.5% (n=54) did not.

The first-week and first-month average VAS scores in the corsets group were statistically significantly lower than those who did not use corsets (p<0.001, p=0.002, respectively). No statistically significant difference was found in the first week and first-month VAS changes of the patients who did not use corsets (p=0.059) (Table 1, Table 2, Figure 1).

Table 1. Baseline demographics, VAS and ODI scores in the first week and month

Age Mean±SD (Min-Max)		49.6±13.3 (22-71)
Gender n (%)	Female	49 (48.5)
	Male	52 (51.5)
Level n (%)	Double	48 (47.5)
	Single	53 (52.5)
Corset n (%)	No	54 (53.5)
	Yes	47 (46.5)
VAS Mean±SD/Min-Max (Median)	1st week	4.60±1.33 / 2-6 (5)
	1st month	2.19±1.05 / 1-4 (2)
	difference	2.42±1.23 / 0-5 (2)
	p-value*	<0.001
ODI Mean±SD/Min- Max (Median)	1st week	39.4±10.7 / 20-60 (40)
	1st month	18.9±13.6 / 0-60 (20)
	Difference	20.5±12.2 / 0-40 (20)
	p-value*	<0.001

**Wilcoxon Test.* VAS: Visual analog scale, ODI: Oswestry Disability Index

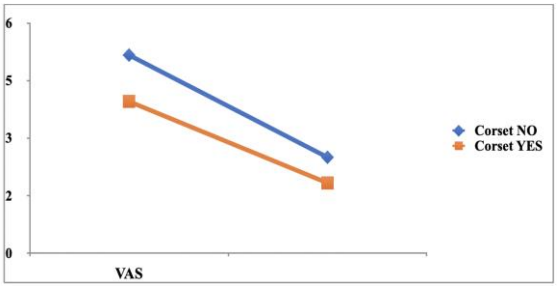

Figure 1: The first-week and first-month average VAS scores in the corsets group were statistically significantly lower than those who did not use corsets (p<0.001, p=0.002, respectively). No statistically significant difference was found in the first-week and first-month VAS changes of the patients who did not use corsets (p=0.059). VAS: Visual analog scale, ODI: Oswestry Disability Index

The first-week and first-month average ODI scores in the corsets group were statistically significantly lower than those who did not use corsets (p=0.012, p<0.001, respectively). The change in ODI scores from the first week to the first month was statistically significantly higher in patients wearing corsets (p<0.001) (Table 1, Table 2, Figure 2).

Table 2. The change in VAS and ODI scores regarding corset use

	No Corset		Wearing Corset		
	Mean±SD	Min-Max (Median)	Mean±SD	Min-Max (Median)	p-value#
1st week VAS	5.17±0.77	4-6 (5)	3.96±1.55	2-6 (5)	<0.001
1st-month VAS	2.50±1.08	1-4 (2.5)	1.83±0.89	1-4 (2)	0.002
VAS difference	2.67±1.12	1-5 (2.5)	2.13±1.30	0-4 (2)	0.059
1st week ODI	42.2±10.4	30-60 (40)	36.2±10.1	20-50 (40)	0.012
1st month ODI	27.2±12.0	10-60 (30)	9.4±7.6	0-20 (10)	<0.001
ODI difference	15.0±12.7	0-40 (10)	26.8±7.8	10-40 (30)	<0.001

#Mann Whitney U Testi. VAS: Visual Analog Scale, ODI: Oswestry Disability Index

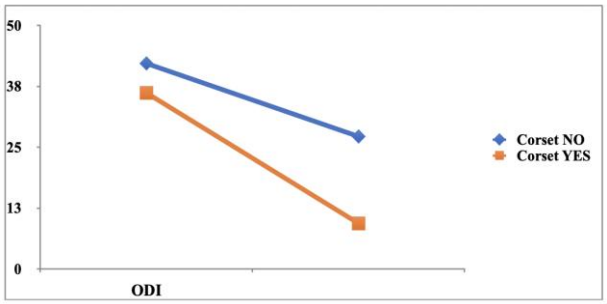

Figure 2: The first-week and first-month average ODI scores in the corsets group were statistically significantly lower than those who did not use corsets (p=0.012, p<0.001, respectively). The change of ODI scores from the first week to the first month was statistically significantly higher in patients wearing corsets (p<0.001). VAS: Visual Analog Scale, ODI: Oswestry Disability Index

In patients aged ≤65, the first-week average VAS score of patients wearing corsets was statistically significantly lower (p=0.002). There was no statistically significant difference in the first-week and first-month VAS changes of the patients who did and did not use corsets (p=0.142). The first-week average ODI scores of the patients wearing corsets were statistically significantly lower than those who did not (p=0.020). The change in ODI scores from the first week to the first month was statistically significantly higher in patients wearing corsets (p<0.001) (Table 3).

In patients aged >65 years, the first-week average VAS scores of patients wearing corsets were statistically significantly lower (p=0.048). There was no statistically significant difference in the first-week and first-month VAS changes of the patients who did and did not use corsets (p=0.533). There was no statistically significant difference in the first week's average ODI scores of the patients who did and did not use corsets (p=0.235). The first-week and first-month changes in ODI scores were statistically significantly higher in patients using corsets (p=0.001) (Table 3).

Table 3. The change in VAS and ODI scores regarding age

		No Corset		Wearing Corset		
Age Group		Mean±SD	Min-Max (Median)	Mean±SD	Min-Max (Median)	p-value#
<65	1st week VAS	5.20±0.79	4-6 (5)	4.00±1.63	2-6 (5)	0.002
	VAS difference	2.71±1.06	1-5 (3)	2.18±1.36	0-4 (2)	0.142
	1st week ODI	42.0±10.6	30-60 (40)	35.6±10.5	20-50 (40)	0.020
	ODI difference	15.56±13.24	0-40 (10)	26.2±8.2	10-40 (30)	<0.001
>65	1st week VAS	5.00±0.71	4-6 (5)	3.85±1.34	2-6 (3)	0.048
	VAS difference	2.44±1.42	1-5 (2)	2.00±1.15	0-4 (2)	0.533
	1st week ODI	43.3±10.0	30-60 (40)	37.7±9.3	20-50 (40)	0.235
	ODI difference	12.2±9.7	0-30 (10)	28.5±6.9	20-40 (30)	0.001

* Mann Whitney U Testi. VAS: Visual Analog Scale, ODI: Oswestry Disability Index

In single-level patients, the first-week average VAS scores of those who used corsets were statistically significantly lower than those who did not (p<0.001). The first-week and first-month changes in VAS scores were statistically significantly lower in patients who used corsets (p<0.001). The first week average ODI scores of the patients who used corsets were statistically significantly lower than those who did not (p=0.002). The first-week and first-month changes in ODI scores were statistically significantly higher in patients who used corsets (p=0.006) (Table 4).

There was no statistically significant difference in the first-week average VAS scores of the double-level patients who did and did not use corsets (p=0.752). The first-week and first-month changes in VAS scores were statistically significantly higher in patients using corsets (p=0.012). There was no statistically significant difference in the first-week average ODI scores of the patients who did and did not use corsets (p=0.196). The first-week and first-month changes in ODI scores were statistically significantly higher in patients wearing corsets (p<0.001) (Table 4).

Table 4. The change in VAS and ODI scores regarding corset use and type of hernia

		No Corset		Wearing Corset		
Level		Mean±SD	Min-Max (Median)	Mean±SD	Min-Max (Median)	p-value#
Single	1st week VAS	5.00±0.83	4-6 (5)	2.77±0.95	2-5 (3)	<0.001
	VAS difference	3.11±0.89	2-5 (3)	1.42±0.99	0-3 (2)	<0.001
	1st week ODI	37.8±8.0	30-50 (40)	29.6±8.2	20-40 (30)	0.002
	ODI difference	16.7±12.7	0-40 (20)	25.4±8.6	10-40 (30)	0.006
Double	1st week VAS	5.33±0.68	4-6 (5)	5.43±0.51	5-6 (5)	0.752
	VAS difference	2.22±1.15	1-5 (2)	3.00±1.10	1-4 (3)	0.012
	1st week ODI	46.7±10.7	30-60 (50)	44.29±5.07	40-50 (40)	0.196
	ODI difference	13.3±12.7	0-30 (10)	28.6±6.5	20-40 (30)	<0.001

* Mann Whitney U Testi. VAS: Visual Analog scale, ODI: Oswestry Disability Index

4. DISCUSSION AND CONCLUSION

LDH is a serious disease, as surgical treatment could cause complications and reduce the patient's quality of life. Studies conducted in LDH surgery; demonstrated to improve patients' quality of life [12]. Complications seen after LDH surgery can be elaborated as infection, increased motor deficit, disruption of the mechanical integrity of the vertebral column, spinal cord compression, bleeding, urinary retention, and paralytic ileus. Surgery-originated iatrogenic complications such as nerve root, dura mater, spinal cord, or other adjacent structure injuries may also occur [13]. Among the complications that may develop, the most important one is the recurrence of the disease due to reasons such as the technique applied, herniation level, patient selection unsuitable for surgery, and the patient's failure to act in accordance with post-operative body mechanics [14].
Patients with LDH surgery may also experience problems such as pain-related personal care, inadequacies in physical movements such as walking, standing, and lifting, and changes in their social lives. These deficiencies negatively affect the patient's daily activities and quality of life. In the previous literature, most studies on non-operative treatments in LDHs evaluated methods such as manipulation, epidural injections, nerve root blocks, corset, traction, lumbar school, or non-operative treatments published retrospectively [15].

The resorption process significantly improved clinical parameters by adding muscle relaxants, analgesics, and anti-inflammatory medications. However, there is no correlation between clinical improvement and disc size, and clinical improvement may occur before significant morphological changes are observed in the disc prior to radiological amelioration. This could be explained by the progressive decrease of pressure in the herniated disc and especially by the regression of the inflammation process accompanying the herniation [16].

In LDH, the effect of the treatment program, including physical therapy modalities, rest, drug therapy, and exercise on clinical parameters, starts in the early period. Later on, this treatment program may be effective in the natural course of herniation and can lead to morphological changes with the contribution of the process [17].

There are many studies in which lumbar corsets are used in postoperative care. Several studies have used a corset or waist corset following arthrodesis with

instrumentation [18-20]. However, the type, duration, and corset regime varied in these studies. The rationale for using a corset or corset depends on the goals of the treatment. Such goals may include limiting mobility, helping to relieve post-operative pain, improving fusion rates, or improving patient-reported functional outcomes [19]. Numerous authors have reported using corsets or splints following lumbar arthrodesis. In our study, regarding the pain and patient improvement parameters, the first-week and first-month average VAS scores in patients wearing corsets were statistically significantly lower. At the same time, no difference was found between patients who did not use corsets. Additionally, the first-week and first-month average ODI scores in the corsets group were statistically significantly lower than those who did not use corsets. The change in ODI scores from the first week to the first month was statistically significantly higher in patients wearing corsets.

As for the factors against using corsets, the main question is the muscular response to the corset. There are conflicting data in the literature because different reports indicate that the corset can strengthen or weaken the lumbar muscles or has no effect. However, none of these studies were specifically designed to study the effect of the corset in patients undergoing spinal surgery [21]. In previous articles by Yee et al. (2008) and Zoia et al. (2018), no significant benefit of the corset has been shown, contradicting our findings [22, 23]. Takasaki and Miki (2017) conducted a systematic review with a meta-analysis on lumbosacral orthoses and elaborated that no negative effect has been observed in 1 to 6 months. However, they also admitted that the quality of evidence was low, and quality trials were required to draw a definitive conclusion [24]. Our study obtained similar outcomes in the first-week average VAS scores of patients wearing corsets in patients aged >65 and ≤65 with single-level LDH. The first-week and first-month changes in VAS scores were significantly higher in patients using corsets with double-layer LDH.

Last but not least, we also assumed that the patient-reported benefit from corset utilization might be related to behavioral aspects of the study population. Turkish people use corsets, braces and similar traditional equipment in painful situations.

Early adoption of the corset in the postoperative period can help rest and promote the dynamic healing of aching back muscles. In addition, our findings indicated that the use of corsets promoted early recovery from rehabilitation and returns to daily activities.

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