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ORIGINAL ARTICLE
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Erectile Dysfunction in Patients with Lumbar Herniated Disc

Lomber Disk Hernili Hastalarda Erektil Disfonksiyon

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ABSTRACT

Introduction: Erectile dysfunction (ED), is defined as a man's inability to achieve or maintain a sufficient level of penile erection for sexual intercourse. It is reported that ED's prevalence is between 30-52% in patients aged 40-70. There are many studies examining the effects of chronic pain, diabetes, rheumatoid diseases and knee arthroplasty on ED in the literature. In this study we aimed to examine the effects of lumbar disc herniation on ED.

Material and Method: In this study there are two groups named control group and experimental group. The experimental group includes male patients, who have been admitted to the neurosurgery clinics, diagnosed with lumbar disc herniation clinically and radiological. Patients with a history of other risc factors to ED excluded from the study. Furthermore, patients diagnosed with conus medullaris or cauda equina syndrome were also excluded. VAS scores, whether any motor losses in clinical findings, or any sense or reflex losses were noted. Radiological findings were recorded and classified. FSH, LH, and testosterone levels were noted. IIEF (International Index of Erectile Function), Beck Depression Inventory, and Beck Anxiety Inventory tests were performed. Obtained data was analysed statistically.

Results: No statistically significant ED prevalence differences were found between the patients who have been diagnosed with lumbar herniated disc and the control group. It has been found out that disc location affects ED prevalence and severity and there are statistically significant differences in terms of IIEF-5 scores between the cases of laterally herniated disc and centrally herniated discs. Contrary to other studies in the literature, no significant relationship between VAS and ED was found out.

Conclusion: The higher incidence of ED in patients with centrally herniated disc may be due to the pressure to sacral roots. Therefore, we think that male patients with disc herniation causing central canal compression should be evaluated more carefully in terms of ED.

Keywords: Erectile dysfunction, Lumbar Herniated disc, depression

ÖZ

Giriş: Erektil disfonksiyon (ED), bir erkeğin cinsel ilişki için yeterli düzeyde penis ereksiyonunu sağlayamaması veya sürdürememesi olarak tanımlanır. 40-70 yaş arası hastalarda ED prevalansının %30-52 arasında olduğu bildirilmektedir. Literatürde kronik ağrı, diyabet, romatoid hastalıklar ve diz artroplastisinin ED üzerine etkilerini inceleyen bazı çalışmalar bulunmaktadır. Bizim bu çalışmadaki amacımız lomber disk hernisinin ED üzerine etkisini göstermektir.

Gereç ve Yöntem: Bu çalışmada kontrol grubu ve deneysel grup olarak iki grup bulunmaktadır. Deney grubu, beyin cerrahisi kliniklerine başvuran, klinik ve radyolojik olarak lomber disk hernisi tanısı almış erkek hastalardan oluşmaktadır. Acil servis için diğer risk faktörlerinin öyküsü olan hastalar çalışma dışı bırakıldı. Ayrıca konus medullaris veya kauda ekina sendromu tanısı alan hastalar da çalışma dışı bırakıldı.VAS skorları, klinik bulgularda herhangi bir motor kayıp veya duyu veya refleks kaybı olup olmadığı not edildi. Radyolojik bulgular kaydedildi ve sınıflandırıldı. FSH, LH ve testosteron seviyeleri kaydedildi. IIEF (Uluslararası Erektil Fonksiyon İndeksi), Beck Depresyon Envanteri ve Beck Anksiyete Envanteri testleri yapıldı. Elde edilen veriler istatistiksel olarak analiz edildi.

Bulgular: Bel fıtığı tanısı konan hastalar ile kontrol grubu arasında ED prevalansı açısından istatistiksel olarak anlamlı fark bulunmadı. Disk yerleşiminin ED prevalansını ve şiddetini etkilediği ve lateral disk hernisi ve santral disk hernisi olguları arasında IIEF-5 puanları açısından istatistiksel olarak anlamlı farklar olduğu bulundu. Literatürde yapılan diğer benzer çalışmaların aksine VAS ve ED arasında anlamlı bir ilişki bulunamamıştır.

Sonuç: Santral disk hernili hastalarda ED insidansının daha yüksek olması sakral köklere olan baskıya bağlı olabilir. Bu nedenle santral kanal basısına neden olan disk hernisi olan erkek hastalarının ED açısından daha dikkatli değerlendirilmesi gerektiğini düşünüyoruz.

Anahtar Kelimeler: Erektil disfonksiyon, Lomber Herniye disk, depresyon

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INTRODUCTION

Erectile dysfunction (ED), is defined as a man's inability to achieve or maintain a sufficient level of penile erection for sexual intercourse (1). It is reported that ED's prevalence is between 30-52% in patients aged 40-70 and reaches up to 80% in patients over 70's. In a population-based study conducted in Turkey, ED's prevalence was found to be as 69.2% (33.2% mild, 27.5% moderate and 8.5% severe ED) (2). Findings of Massachusetts Male Aging Study (MMAS) indicated that in patients aged between 40-70, prevalence of mild, moderate, and severe ED were 17%, 25% and 10%, respectively (3).

Just like all functions in the human body, sexual functions are also controlled by the central nervous system. It is known that especially medial preoptic area of hypothalamus (mPOA), parasagittal area where the genital region's sensory fibers end, temporal region, frontal area, and rhinencephalon in central nervous system are associated with sexual functions. Moreover, it has also been reported that the maintenance of the erection is associated with temporal cortex, inferior frontal gyrus, insula and medial nucleus of amygdala (4,5). These centers are controlled and influenced by many neuroendocrine mediators like dopamine, monoamine system, gamma aminobutyric acid (GABA), oxytocin and prolactin (4,5). Various pathologies may affect these centers in the brain directly or may block pathways associated with these centers.

Aside from the central nervous system, it is known that innervation of penis is autonomic (sympathetic and parasympathetic) and somatic (sensory and motor) and is regulated by pelvic parasympathetic nerves, hypogastric sympathetic nerves and somatic pudendal nerves (6). While sympathetic and parasympathetic nerves are associated with cavernosal nerves, somatic nerves are essentially associated with penile sensory nerves and contraction of bulbocavernosus or ischiocavernosus muscles. Whereas spinal cord structures associated with erectile function responsible for psychogenic erection are sympathetic (T10-L2), structures responsible for basic reflexogenic erection are parasympathetic. Furthermore, Onuf's nucleus and somatic nerve structures (S2-S4) contribute to penile sensitivity with ischiocavernosus and bulbocavernosus muscles which are necessary for rigid erection (7-12).

After spinal cord pathologies, male sexual functions may be adversely affected. Generally, in males who have upper motor neuron lesion (UMNL) on T11 and above (cases with suprasacral-spinal lesion) while reflex erections occur, psychogenic erections do not; in contrast, in those who have complete lower motor neuron lesions, while reflex erections do not occur, psychogenic erections do. This condition is also dependent on the ratio of protected fibers (13, 14). It is known that erection requires normal function of a complex unit in which hormonal factors, vascular structures, peripheral and central mediators and nervous system play a role, therefore, psychogenic, hormonal, neurogenic and arterial pathologies, drugs, iatrogenic reasons, systemic and chronic diseases take part in ED's etiology.

When risk factors for male sexual function disorder are examined, mostly aging, diabetes mellitus (DM) – a chronic disorder, peripheral vascular diseases, cardiac reasons and hypertension, atherosclerosis and smoking associated with cardiac reasons are noticed; subsequently endocrine, neurogenic and psychogenic reasons follow (15). Neurogenic ED may be defined as difficulty in achieving and maintaining penile erection which develops due to a neurological disorder or dysfunction. Neurogenic reasons make up 5-20% of ED etiology (14, 15). In neurogenic ED, the problem may be in the brain or medulla spinalis, pudendal and cavernosal nerves and nerve endings and receptors.

Neurological disorders which are known to cause erectile dysfunction include multiple sclerosis (MS), cerebrovascular cases, spinal cord injuries (SCI), surgery, temporal lobe epilepsy, Guillian Barré syndrome, autonomic neuropathy, Alzheimer's disease, Parkinson's disease, central and peripheral nervous system tumors, polyneuropathies and lumbar disc herniation. Neurogenic ED may be due to toxins such as heavy metals, DM, uremia, alcoholism, HIV infection, leprosy, viral infections, systemic lupus erythematosus (SLE) and diseases such as hemochromatosis or may be seen as peripheral neurogenic ED due to peripheral surgery such as radical prostatectomy, radical cystectomy, lower intestinal surgeries (15).

Lumbar disc herniation is a common disease. Depending on the severity of the patients' pain and presence of neurologic symptoms, its treatment includes drug therapy – called conservative therapy, physical therapy and surgical treatment are practiced. Patients with sexual dysfunction may benefit from surgical treatments compared to other treatments (16).

Neural tube defects, which are known as congenital defects of spinal cord, affect lumbar region in 90% of the cases and sexual function disorders in these cases are mostly seen as ejaculatory disorders. Although ED may arise after a damage related to surgical treatment of spina bifida. it is known that phosphodiesterase 5 inhibitors (PDE5I) are successful in the treatment of this pathology (17). While there are many studies examining the effects of chronic pain, diabetes, rheumatoid diseases and knee arthroplasty on ED. Studies about ED in patients who suffer from lumbar herniated disc are limited. This study intends to determine ED in patients with herniated lumbar disc.

MATERIAL AND METHOD

In the present study, a total of 109 patients at Gaziosmanpaşa University Faculty of Medicine, Department of Neurosurgery and Urology were investigated. The study was approved by the TOGU School of Medicine Research Ethics Committee (01/03/2016, Project No: 16 KAEK 049). This study was conducted in accordance with the Declaration of Helsinki principles. The informed consent forms were obtained from all the patients included in this study.

All the patients' VAS (visual analogue scale) scores, whether there are any motor losses in clinical findings, and whether there are any sense or reflex losses were noted. Radiological findings were recorded and classified (as median and others) according to the distance of the disc, its nature and location. In addition, some laboratory tests and some tests in the form of questions and answers were applied to the patients in order to evaluate the erectile functions of the patients. FSH (follicle stimulating hormone), LH (luteinizing hormone) and total and free testosterone levels in these patients were noted. Later on these patients, IIEF (International Index of Erectile Function), Beck Depression Inventory and Beck Anxiety Inventory tests were performed. Patients with a history of diabetes mellitus, drug use a known neurological disorder other than lumbar disc herniation, surgery related to urinary tract infections, prostate, seminal vesicles and other pelvic organs and testes, in the last month were excluded from the study. Furthermore, patients diagnosed with conus medullaris or cauda equina syndrome were also excluded from the study. In VAS assessment, patients were asked to report the severity of pain visually on VAS scale and were scored from 1 up to 10. The IIEF assessment was evaluated as follows; 6-10: severe, 11-16: moderate, 17-25: mild, 26-30: no erectile dysfunction. In the Beck Depression Inventory test; 10-16 points were considered as mild depressive symptoms, 17-29 points as moderate depressive symptoms and 30-63 points as severe depressive symptoms. In Beck Anxiety Inventory test the following evaluation was made; 8-15 points was considered as mild anxiety, 16-25 points as moderate anxiety, and 26-63 points as severe anxiety.

Two groups were formed in our study to show the relationship between lumbar disc herniation and erectile dysfunction. Group 1 was the experimental group and included 69 patients diagnosed with lumbar disc herniation. Group 1 includes male patients, aged between 18-70, who have been admitted to the neurosurgery clinic, diagnosed with lumbar disc herniation clinically and radiologically, and having symptoms for four or more weeks.

Group 2 was control group. Group 2 was formed with 32 patients who were admitted to urology clinic for infertility and kidney stone examination. The differences between control group and experimental group and whether these results have any statistical significance are examined.

Statistical analysis was made to obtain information about general characteristics of experimental groups. Data for continuous variables are presented as mean ± standard deviation; data related to categorical variables are presented as n (%). When comparing the averages of quantitative variables between groups, The Test of Significance Between Two Means (T test) or one-way analysis of variance (ANOVA) was used. To evaluate the relationship between qualitative variables, Chi-square test was used. When p values were less than 0.05, they were considered as statistically significant. Statistical software was used in calculations (IBM SPSS Statistics 19, SPSS inc., an IBM Co., Somers, NY).

RESULTS

While the mean age in the experimental group was 37.09 ± 7.01 years, it was found to be 34.91 ± 7.75 years in the control group. It is determined that there are no statistically significant differences between them. Parameters of the experimental group in IIEF-5, Beck Depression and Beck Anxiety Inventory test scores were examined and means were found to be 19 ± 4.7, 11.87 ± 10.62 and 13.06 ± 10.86 respectively. The means of these parameters in the control group were determined as 17.91 ± 3.16, 10.91 ± 8.47 and 14.69 ± 7.7 respectively. It is determined that there are no statistically significant differences between means of IIEF-5, Beck Depression and Beck Anxiety Inventory scores. The results are summarized in **Table 1**.

Table 1. Distribution of Quantitative Variables across Groups

Variables	Group 1 (n=69)	Group 2 (n=32)	t	p
Age	37.09±7.01	34.91±7.75	1.407	0.163
IIEF-5	19±4.7	17.91±3.16	1.376	0.172
Beck depression score	11.87±10.62	10.91±8.47	0.489	0.626
Beck anxiety score	13.06±10.86	14.69±7.7	0.863	0.390

Data are presented as Mean ± SD. p: The Test of Significance Between Two Means (t Test), IEF: International Index of Erectile Function

Patients were classified according to their IIEF scores as 6-10: severe, 11-16: moderate, 17-25: mild and 26-30: no erectile dysfunction. When differences between groups were examined, a statistically significant difference was found (p=0.036). The results are summarized in **Table 2**.

Table 2. Distribution of IIEF Scores across Groups

Variables	Group 1 (n=69)	Group 2 (n=32)	X 2	p
IIEF Group			8.541	0.036
0	27(84)	5(16)		
1	15(52)	14(48)		
2	25(66)	13(34)		
3	2(100)	0(0)		

Data are presented as n (%).p: Chi-square test, IIEF: International Index of Erectile Function

When the relation between IIEF-5 variables and lower back and leg pain, motor, sensory and deep tendon reflex loss and disk location parameters are examined, no statistically significant differences in parameters, except for disc location, were found. Statistically significant difference of IIEF-5 scores between patients who have centrally herniated discs and laterally herniated discs have been found out; patients who have centrally herniated discs have significantly lower IIEF-5 scores. Findings are summarized in **Table 3**.

Table 3. Distribution of Qualitative Variables across IIEF-5 Scores

Variables	n (69)	IIEF-5	t/F	p
Lower back pain			0.684	0.498
0	60	18.85±4.84		
1	9	20.00±3.74		
Leg pain			2.516	0.066*
0 (none)	2	23.00±2.83		
1 (left)	19	18.37±4.69		
2 (right)	29	20.34±4.69		
3 (bilateral)	19	17.16±4.26		
Sense loss			0.870	0.388
0	33	19.51±4.87		
1	36	18.52±4.56		
Motor loss			0.361	0.719
0	63	19.06±4.56		
1	3	18.33±6.50		
DTR loss			0.125	0.901
0	63	19.02±4.69		
1	3	18.67±6.03		
Disc location			2.322	0.023
1 (central)	55	18.55±4.73		
2 (lateral)	12	21.92±3.42		

Data are presented as Mean ± SD. p: The Test of Significance Between Two Means (T Test), p*: One-way analysis of variance (ANOVA)
IIEF: International Index of Erectile Function, DTR: Deep tendon reflexes

Patients were grouped according to their IIEF scores as 6-10: severe, 11-16: moderate, 17-25: mild and 26-30: no erectile dysfunction. When means of VAS scores are compared, no statistically significant differences between groups has been found. Findings are presented in **Table 4**.

Table 4. Distribution of IIEF-5 Scores in terms of VAS Scores

Variables	n (69)	VAS	F	p
IIEF-5			1.314	0.277
0	27	6.13±1.67		
1	15	6.13±2.45		
2	25	6.96±1.95		
3	2	2.82±2.00		

Data are presented as Mean ± SD. p: One-way analysis of variance (ANOVA), IIEF: International Index of Erectile Function, VAS: Visual Analogue Scale

DISCUSSION

The primary event in erection, which is influenced by central and peripheral nervous system and hormonal factors, is the beginning of sinusoids swelling with blood subsequent to relaxation of smooth muscle elements in corpus cavernosum in penis after sexual stimulation. As a result of parasympathetic stimuli from preganglionic nerves in intermediolateral column of 2nd and 4th segments of sacral spinal cord and stimuli from cavernosal nerve endings, neurogenic nitric oxide synthase (nNOS) and endothelial nitric oxide synthase (eNOS) is released, subsequently this lipophilic nitric oxide (NO) is released. This NO enters into a smooth muscle cell and mediates the synthesis of cyclic guanosine monophosphate (cGMP). cGMP decreases CA+2 levels in the smooth muscle cell via various mechanisms and initiates and maintains erection by relaxing the cavernosal smooth muscle tissue. Compression of small venules between enlarged sinusoids and tunica albuginea causes the decrease of venous flow, thus keeping the blood in corpus cavernosum. It has been shown that there are many neurotransmitters playing a role in erection and a disruption in any stage of the aforementioned mechanisms may result in erectile dysfunction (7-9).

Neurogenic reasons make up 5-20% of ED etiology. In neurogenic ED, the problem may be in the brain, medulla spinalis, pudendal and cavernosal nerves and nerve endings and receptors. Neurological disorders are known to cause erectile dysfunction include multiple sclerosis (MS), cerebrovascular cases, temporal lobe epilepsy, Guillian Barré syndrome, autonomic neuropathy, Alzheimer's disease, Parkinson's disease, central and peripheral nervous system tumors, polyneuropathies and lumbar disc herniation. For instance, the prevalence of erectile dysfunction in patients with MS is reported to be 43-71% (9).

Another pathology associated with central nervous system are spinal cord injuries (SCI). Spinal cord injuries occur due to not only direct trauma but also hematoma, bone fractures, tumor and spinal artery ischemia. It has been shown that there are abnormalities in EMG's of bulbocavernosus muscle and cavernosal structures, pudendal sensory structures, somatosensory perception, genital sympathetic potential and that SCI disrupts the innervations related to erection (9, 10). Sexual dysfunction may be seen in spinal cord injuries depending on the severity of the injury and whether it is complete or incomplete. While 95% of cases with complete upper spinal cord lesions may have reflex erections, this rate decreases to around 25% when cases with complete lower spinal cord lesions are concerned (9, 10).

Just like spinal cord traumas, it is also known that many bodily functions are disrupted after cerebrovascular cases. A study conducted by Jeon et al. indicated sexual dysfunction rate after this pathology is 47.4%. With a prevalence of approximately 1%, lumbar disc herniation may cause ED by affecting structures in spinal cord, thus

suspending parasympathetic erectogenic pathways going to pelvic plexus. It is known that if the pressure is incomplete then the erection is known to be maintained up to 90% (21).

In a study, Braun et al. reported that disc herniation causes ED in 23.2% of the cases (22). However, no statistically significant relation between lumbar disc herniation and ED was found in our study. In another study, it has been reported that sexual activities are restricted due to pain in 94% of patients with lumbosacral disc herniation (23). However, no statistically significant relation between VAS pain scale and ED was noted in our study either.

Causing radiculopathy in lumbosacral disc herniation, nerve root pressure may also negatively affect erection mechanism since it would also disrupt the release of nitric oxide (nerve-mediated NO/nNO) regulated by parasympathetic nerves. In cases with herniated lumbar disc, in addition to localization of the hernia, age is also an important factor and it is indicated that erection is better especially in young patients under the age of 30 (24-26). In our study, experimental group and control group ages were made to be similar taking the age factor into account; also, the distributions were statistically similar.

In cases with herniated lumbar disc, in addition to localization of the hernia, age is also an important factor and it is indicated that erection is better especially in young patients under the age of 30. In a study examining a total of 43 cases with the mean age of 41.4, it has been reported that 55% of males who suffered from ED after the onset of back pain, had often experienced decreased libido (18%), premature ejaculation and ED. This study indicates that 78% of the cases reported an increase in the frequency and quality of sexual intercourse after surgery (27). In a case report study, a patient who suffered from ED for 15 years reported that these complaints have been alleviated with a surgery he had when he was 35 (28). Similar results have been reported in many studies (29).

Degree of recovery in patients with severe ED who had a surgery related to herniation may not be at a desirable level (4). 19 cases suffering from ED under age of 55 with cervical spondylosis were examined. Mean age of the cases was 48.8 and their post-operative IIEF scores have increased from 12.1±5.6 to 17.6±5.5 after 11.8 months of monitoring. It has been shown that ED has improved by 84.2% in the last monitoring. Berg et al. reported that sexual quality of life has improved thanks to decreased back pain after lumbar disc herniation treatment (25). Another study indicates mild ED accompanied by radiculopathy have improved after lumbar disc surgery (26). However, Doğan et al. reported in a study that examines herniated lumbar disc cases causing cauda equina syndrome, sexual dysfunction in one case did not improve after surgery (28).

Excluding surgery, first-line therapy is prescribing PDE5I's to the patients. Oral treatments should be considered before and after decompression to achieve erections earlier. For patients who continue to have complaints despite the application of conservative treatments or drug therapy, penile prostheses may be effective since there is a fibrosis in penile tissue level, even if they go through decompression surgery.

CONCLUSION

We could find no studies neither in Turkish nor in English literature specifically about ED prevalence in patients with lumbar disc herniation. Our study aimed to determine the prevalence and severity of erectile dysfunction in patients with lumbar disc herniation and reveal their relation to parameters such as lower back and leg pain, VAS score, motor, sensory and deep tendon reflex losses and location of the disc hernia. When the results were analyzed, the following has been found:

No statistically significant ED prevalence differences were found between the patients who have been diagnosed with lumbar herniated disc and the control group. The most important reason for this is found to be the incidence of ED being quite high but neurogenic causes of ED making up only 10-20% of the cases.

It has been found out that disc location affects ED prevalence and severity and there are statistically significant differences in terms of IIEF-5 scores between the cases of laterally herniated disc and centrally herniated discs. The higher incidence of ED in patients with centrally herniated disc is thought to be the pressure to sacral roots. Contrary to other studies in the literature, no significant relationship between VAS and ED was found out.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was approved by the TOGU School of Medicine Research Ethics Committee (01/03/2016, Project No: 16 KAEK 049).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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