



## ORIGINAL ARTICLE

# Predictor Factors in the Development of Erectile Dysfunction After Inguinal Hernia Repair

## *Inguinal Herni Onarımından Sonra Erektıl Disfonksiyon Gelişimini Öngören Faktörler*

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### Abstract

**Introduction:** This study aimed to determine the factors predicting erectile dysfunction (ED) in patients who underwent inguinal hernia repair (ICR) in our hospital.

**Methods:** Patients who underwent ICR were reviewed retrospectively. The number of patients included in the study was 208. The patients were divided into two groups: Group 1 (non-ED) and Group 2 (developing ED). EF and testicular volume were evaluated with scrotal ultrasound and duplex sonography before and 3 months after surgery. Sexual function was assessed using a validated anonymized questionnaire International Index of Erectile Function. The results were reviewed using IBM SPSS v23.0. Postoperative complications were evaluated according to the Clavien Scale.

**Results:** The number of patients was 148 (71.1%) in Group 1 and 60 (28.9%) in Group 2. Of the patients, 17.2% (60/348) developed ED. According to the results of the multivariate analysis, age >40 years (OR: 14.64; 95% CI: 2.54–84.31; p=0.003), not having received perioperative narcotics (OR: 96.44; 95% CI: 16.82–553.05; p<0.001), having received perioperative antispasmodics (OR: 30.28; 95% CI: 5.38–170.45; p<0.001), presence of preoperative benign prostatic obstruction (BPO) (OR: 8.42; 95% CI: 1.21–58.81; p=0.032), and small preoperative testicle size (OR: 1.77; 95% CI: 1.25–2.50; p<0.001) increase the risk of postoperative ED.

**Discussion and Conclusion:** Advanced age, history of rheumatic disease and BPO, not using perioperative nonsteroidal anti-inflammatory drugs and narcotic drugs, using antispasmodic drugs, and having small preoperative testicular size increase the risk of ED.

**Keywords:** Testicular atrophy; Erectile dysfunction; Inguinal hernia

Inguinal hernia repair (ICR) is a frequently used procedure in surgical clinics.<sup>[1–4]</sup> Complications such as urinary retention,<sup>[5,6]</sup> testicular atrophy, inguinal pain, and hypoesthesia may develop.<sup>[7]</sup> In addition, testicular atrophy may cause

erectile dysfunction (ED), loss of libido, and infertility at an early age in cases where there is dysfunction in the other testis.<sup>[7,8]</sup> These complications are associated with damage to the neurovascular component during surgery and

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foreign body reaction due to mesh.<sup>[9]</sup> ED may bring along factors such as continuous hormone replacement, use of phosphodiesterase type-5 inhibitors, and increased costs.<sup>[10]</sup> Knowing the risk factors that cause ED can help reduce the likelihood of it occurring. There are many studies showing that ICR has a positive effect on erectile function (EF).<sup>[11-14]</sup> We learned that the predictive factors causing ED were not investigated in the studies. In our study, we found the predictor factors [age and type of hernia, type of surgical method, duration of operation, use of nonsteroidal anti-inflammatory drug (NSAIDs) and antispasmodics during the operation, preoperative and postoperative testicular size, preoperative benign prostatic obstruction (BPO), DM, and rheumatic diseases that may cause ED] were investigated.

## Materials and Methods

Male patients who underwent open and laparoscopic ICR surgery between 2010 and 2020 were included in the study. Patients under the age of 18 years and people with preexisting ED were excluded from the study. Ethical approval was obtained for the study from our Lokman Hekim University Ethics Committee (date: 27.05.2020, no: 2020/037).

A total of 578 patients' data were retrospectively scanned. We obtained the EF information of 453 of the patients. We excluded 105 of 453 patients as they had preoperative ED. Of the remaining patients, 140 were excluded due to missing data. Finally, 208 patients were included in the study. The patients were categorized into two groups: Group 1 (non-ED) and Group 2 (ED-developing). EF and testicular volume were evaluated at 3 months preoperatively and 3 months postoperatively. Testicular volume and perfusion were evaluated with scrotal ultrasound and duplex sonography. Sexual function was assessed with an anonymized questionnaire [International Index of Erectile Function (IIEF)].<sup>[14]</sup> An IIEF score of less than 26 was used as ED. According to IIEF, the score was categorized as: severe ED (score 6–10); moderate ED (score 11–16); mild-to-moderate ED (score 17–21); mild ED (score 22–25); no ED (score 26–30).<sup>[15]</sup>

We based our research on the effect of age on EF in the Massachusetts study and divided patients as under 40 years old and over 40 years old.<sup>[16]</sup> We used the Clavien scale for postoperative complications.

## Statistical Analysis

The Chi-squared test or Fisher's test was used to compare categorical variables, and the Mann-Whitney U test was used to compare continuous variables that were not normally distributed. Multivariate logistic regression analysis

**Table 1.** Medical and sociodemographic characteristics of the participants

	n	%
Age, years		
<40	76	36.5
>40	132	63.5
Case status		
Primary	169	81.3
Secondary	39	18.7
Side operated		
Right	57	27.4
Left	65	31.3
Bilateral	86	41.3
Diabetes mellitus		
Present	60	28.8
Not present	148	71.2
Laparoscopic vs open repair		
Laparoscopic	129	62.0
Open repair	79	38.0
Operative time		
<60 min	120	57.7
>60 min	88	42.3
Anesthesia duration		
<60 min	91	43.8
>60 min	117	56.2
Perioperative narcotic use		
Used	162	77.9
Did not use	46	22.1
Perioperative antispasmodic use		
Did not use	163	78.4
Used	45	22.6
Type of hernia		
Direct	55	26.4
Indirect	89	42.8
Direct + indirect	64	30.8
Testicular atrophy status		
Present	29	13.9
Not present	179	86.1
Rheumatic disease		
Present	21	10.1
Not present	187	89.9
Perioperative NSAID use		
Used	165	79.3
Did not use	43	20.7
Preoperative BPO		
Present	35	16.8
Not present	173	83.2

NSAID: Nonsteroidal anti-inflammatory drug; BPO: Benign prostatic obstruction.

was performed to identify predictors of ED. Probability ratios were calculated at 95% confidence intervals. IBM SPSS 23.0 was used for all analyses, and  $p < 0.05$  was considered statistically significant.

## Results

Of the 208 patients included in the study, 148 (71.1%) were in Group 1 and 60 (28.9%) were in Group 2. ED developed in 17.2% (60/ 348) of the patients.

Preoperatively, the number of secondary cases was 39 (18.7%), bilateral inguinal hernia cases 86 (41.3%), combined inguinal hernia 64 (30.8%), and open repair 79 (38.0%). Mesh graft was applied to all patients (Table 1).

In a patient (64 years old) with testicular atrophy who developed ED, there were complaints of loss of libido although hormonal test results were normal (FSH: 7.23 mIU/ml; LH: 5.81 mIU/ml; testosterone: 10.7 nmol/L). The Clavien grades 4 and 5 were not detected in any of the patients (Clavien 4: single or multiple organ dysfunction; Clavien 5: complications of death). A hydrocele developed in 1 patient 6 months after the operation.

In the postoperative period, the clinical and demographic characteristics of the patients who developed ED were evaluated statistically. The rate of postoperative ED (+) in advanced-age patients ( $>40$  years) ( $p=0.012$ ), in those operated on the left side ( $p=0.001$ ), in those who underwent open repair ( $p<0.001$ ), in secondary cases ( $p=0.024$ ), and in those who did not use a perioperative narcotic ( $p<0,001$ ) was determined to be higher. In addition, postoperative ED rates were found to be higher in those using perioperative antispasmodics ( $p<0.001$ ), those with an indirect hernia ( $p=0.001$ ), those with a rheumatic disease ( $p=0.012$ ), those using perioperative NSAIDs ( $p=0.004$ ), and those with preoperative BPO ( $p<0.001$ ). Postoperative hospital stay was similar in both groups (1 day;  $p=0.990$ ) Finally, the preoperative testicular size was found to be smaller than the postoperative ED (mean rank=90.73) patients without postoperative ED (mean rank=138.48) ( $p<0.001$ ) (Table 2).

We used multivariate regression analysis to identify independent risk factors leading to the development of ED. Based on this, age  $>40$  years (OR: 14.64; 95% CI: 2.54–84.31;  $p=0.003$ ), no perioperative narcotic (OR: 96.44; 95% CI: 16.82–553.05;  $p<0.001$ ), received perioperative antispasmodics (OR: 30.28; 95% CI: 5.38–170.45;  $p<0.001$ ), presence of preoperative BPO (OR: 8.42; 95% CI: 1.21–58.81;  $p=0.032$ ), and small preoperative testicular size (OR: 1.77; 95% CI: 1.25–2.50;  $p<0.001$ ) increase the risk of postoperative ED (Table 3).

## Discussion

ED is a complication of inguinal hernia, and it can be corrected with hernioplasty. In our study with 208 patients, we determined the risk of ED development following ICR to be 17.14%. El-Awady and Elkholy<sup>[11]</sup> reported in their study that the ED rate was 10% at postoperative month 3 and 5% at postoperative month 9.

In a study by Jangjoo et al.,<sup>[12]</sup> patients who underwent hernia repair with the Stoppa technique were evaluated in terms of IIEF scores in the first and sixth months, and a significant decrease was found in the first month compared to the preoperative and sixth months. It has been reported that the inflammation caused by the wider incision line and the use of larger mesh pieces in the hernioplasty technique lead to prolonged pain.

Ertan et al.<sup>[17]</sup> demonstrated in their study that advanced age increased the risk of ED. We also determined that advanced age increases the risk of ED. Zieren et al.<sup>[18]</sup> did not report any cases of surgery-related ED.

Chen and Amid<sup>[19]</sup> showed that the risk of ED increases in secondary cases. We arrived at the same conclusion in our study.

Singh et al.<sup>[10]</sup> reported clinically significant deterioration in testicular functions of patients who underwent open repair with mesh compared to those who underwent laparoscopic repair. According to the results of this study, there was an increase in FSH and LH levels and a decrease in testosterone levels.

In their study, Akbulut et al.<sup>[20]</sup> concluded that testicular functions were more impaired in patients who underwent laparoscopic mesh compared to patients who underwent open repair.

As ICR was performed with mesh in all patients in this study, the effect of mesh use on testicular atrophy and EF could not be evaluated. However, we found that the rate of testicular atrophy was higher in patients with open repair, but this did not increase the risk of ED.

In our study, unlike other studies, we determined that a history of rheumatic disease and BPO, nonuse of perioperative NSAIDs and narcotics, using antispasmodic drugs, indirect hernia, and preoperative small testicle size increased the risk of ED. We are of the opinion that rheumatic diseases increase the risk of ED by damaging vascular structures or slowing down wound site healing. We think that ED, which is masked in patients with a history of BPO, is induced by postoperative pain and inguinal sensory loss. Perioperative use of NSAIDs and narcotics decreases surgery-related pain and edema, which helps the patients resume

**Table 2.** Univariate analyses results used to determine independent risk factors that cause postoperative erectile dysfunction

	Total		Group 1 (postoperative ED (-) (n=148)		Group 2 (postoperative ED (+) (n=60)		p
	n	%	n	%	n	%	
Age							0.012
<40 years	76	100	62	81.6	14	18.4	
>40 years	132	100	86	65.2	46	34.8	
Case status							0.024
Primary	169	100	126	74.6	43	25.4	
Secondary	39	100	22	56.4	17	43.6	
Side operated							0.001
Right	57	100	46	80.7	11	19.3	
Left	65	100	35	53.8	30	46.2	
Bilateral	86	100	67	77.9	19	22.1	
Diabetes mellitus							0.054
Present	60	100	37	61.7	23	38.3	
Not present	148	100	111	75.0	37	25.0	
Laparoscopic vs open repair							<0.001
Laparoscopic	129	100	113	87.6	16	12.4	
Open repair	79	100	35	44.3	44	55.7	
Anesthesia time							0.395
<60 min	91	100	62	68.1	29	31.9	
>60 min	117	100	86	73.5	31	26.5	
Operative time							0.849
<60 min	120	100	86	71.7	34	28.3	
>60 min	88	100	62	70.5	26	29.5	
Perioperative narcotic use							<0.001
Used	162	100	144	88.9	18	11.1	
Did not use	46	100	4	8.7	42	91.3	
Perioperative antispasmodic use							<0.001
Did not use	163	100	135	82.8	28	17.2	
Used	45	100	13	28.9	32	71.1	
Type of hernia							0.001
Direct	55	100	43	78.2	12	21.8	
Indirect	89	100	51	57.3	38	42.7	
Direct + indirect	64	100	54	84.4	10	15.6	
Rheumatic disease							0.012
Present	21	100	10	47.6	11	52.4	
Not present	187	100	138	73.8	49	26.2	
Perioperative NSAID use							0.004
Used	165	100	125	75.8	40	24.2	
Did not use	43	100	23	53.5	20	46.5	
Preoperative BPO							<0.001
Present	35	100	12	34.3	23	65.7	
Not present	173	100	136	78.6	37	21.4	
Medical treatment status of those with a BPO history							0.411
Received	15	100	4	26.7	11	73.3	
Did not receive	20	100	8	40.0	12	60.0	
Length of hospital stay, median (range)	1 (1–2)		1 (1–2)		1 (1–2)		<0.001
Preoperative testicle size (cc) median (range)	15 (13–22)		16.90 (13–22)		15 (13–19)		<0.001
Postop testicle size (cc) median (range)	14 (6–21)		14 (6–19)		14 (6–21)		0.575

ED: Erectile dysfunction; NSAID: Nonsteroidal anti-inflammatory drug; BPO: Benign prostate obstruction.

**Table 3.** Results of multivariable logistic regression analyses for ED

ED status	Factor	p	OR	95% CI
Age (years)	>40	0.003	14.64	2.54–84.31
Perioperative narcotic use	Did not use	<0.001	96.44	16.82–553.05
Perioperative antispasmodic use	Used	<0.001	30.28	5.38–170.45
Preoperative BPO	Present	0.032	8.42	1.21–58.81
Preoperative testicle size (cc)	Continuous	<0.001	1.77	1.25–2.50

ED: Erectile dysfunction; OR: Odds ratio; CI: Confidence interval; BPO: Benign prostate obstruction.

their sexual lives at an earlier time. In indirect hernia, the intestinal contents that descend to the scrotum cause swelling. Postoperative scrotal swelling in indirect hernia is more remarkable and takes longer to resolve compared with other types of hernia. Therefore, it may have affected EF negatively. Short preoperative testicle size may have had a psychological impact on the patients, which in turn may have increased the probability of ED.

Our study has some limitations. It was done retrospectively, the number of patients in the groups was different, and we did not study on the associated problems such as coitus and premature ejaculation, that would improve the clinical importance of the study.

## Conclusions

Finally, being older than 40 years of age, having rheumatic disease and a history of BPO, not using NSAIDs and narcotic drugs during the operation period, using antispasmodic drugs, and having a preoperative testicle size smaller than normal increase the risk of ED.

**Peer-review:** Externally peer-reviewed.

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**Authorship Contributions:** Concept: FA; Design: FA, BÇ; Supervision: BÇ; Materials: FA; Data Collection or Processing: FA; Analysis or Interpretation: FA; Literature Search: FA, BÇ; Writing: BÇ; Critical Review: FA, BÇ.

**Conflict of Interest:** None declared.

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