

# Comparison of Laparoscopic and Microscopic Subinguinal Varicocelectomy in terms of Postoperative Scrotal Pain

Assist. Prof. Dr. Haluk Söylemez, MD, Assist. Prof. Dr. Necmettin Penbegül, MD,  
Assist. Prof. Dr. Murat Atar, MD, Assist. Prof. Dr. Yaşar Bozkurt, MD,  
Assist. Prof. Dr. Ahmet Ali Sancaktutar, MD, Assist. Prof. Dr. Bülent Altunoluk, MD

## ABSTRACT

**Background and Objectives:** In this study, 2 different varicocelectomy methods were compared with regard to postoperative scrotal pain, length of operation, and complications.

**Methods:** Forty varicocele patients, who visited our clinic because of infertility or scrotal pain between 2008 and 2009, were enrolled in this clinical study. Microscopic subinguinal varicocelectomy was performed on 20 patients in Group I, and laparoscopic varicocelectomy was performed on 20 patients in Group II. Following surgery, the patients were assessed for postoperative requirements for analgesia; return to normal activity; varicocele recurrence; hydrocele formation; scrotal pain at postoperative days 1, 3, and 7; and other complications.

**Results:** Mean age was  $24.2 \pm 3.4$  years in Group I and  $25.1 \pm 2.1$  years in Group II. Mean pain scores at postoperative 1, 3, and 7 days in Group I were ( $5.20 \pm 1.14$ ,  $4.60 \pm 0.97$ , and  $3.50 \pm 0.97$ , respectively) significantly higher than those of Group II ( $0.70 \pm 0.82$ ,  $0.60 \pm 0.84$ , and  $0.10 \pm 0.32$ , respectively). Time to return to normal activity was significantly shorter in Group II ( $3.7 \pm 2.1$  days) compared with Group I ( $6.8 \pm 3.4$  days) ( $p=0.028$ ). However, the number of recurrences and hydroceles, as a complication of varicocelectomy, was 2 times higher in Group II (10%) than in Group I (5%).

**Conclusions:** We believe that laparoscopic varicocelectomy is a safe, effective, and minimally invasive procedure. Furthermore, reduced postoperative discomfort and earlier return to normal activity are additional advantages of this method.

Dicle University, Medical Faculty, Department of Urology, Diyarbakir, Turkey (Drs. Söylemez, Penbegül, Atar, Bozkurt, Sancaktutar).

Sutcu Imam University, Medical Faculty, Department of Urology, Kahramanmaraş, Turkey (Dr. Altunoluk).

Address correspondence to: Assist. Prof. Dr. Haluk Söylemez, MD, Dicle University, Medical Faculty, Department of Urology, Diyarbakir, Turkey. Telephone: +90 412 248 8583, Pbx: +90 412 248 8440, E-mail: drhaluks@yahoo.com

DOI: 10.4293/108680812X13427982376220

© 2012 by JSLS, *Journal of the Society of Laparoendoscopic Surgeons*. Published by the Society of Laparoendoscopic Surgeons, Inc.

**Key Words:** Laparoscopy, Microscopy, Postoperative pain, Varicocele.

## INTRODUCTION

Varicocele is the varicose dilatation of the pampiniform venous plexus, and it is encountered in 10% to 15% of the male population. While this rate is 21% to 41% for males with primary infertility, it may rise up to 70% to 80% in males with secondary infertility.<sup>1,2</sup>

The target of varicocele surgery is to correct the venous drainage to spare the testicle from the harmful effects of the varicocele. During the surgery, arterial structures, ductus deferentes, and lymphatics should be preserved.<sup>3,4</sup>

To date, various open surgery techniques, sclerotherapy, and lately laparoscopic surgery have been introduced.<sup>5-7</sup> Recently, microscopic varicocelectomy, an open surgery technique, has become a widely recognized and utilized method due to its low recurrence and morbidity rates.<sup>4,8</sup>

In previous reports in the literature,<sup>9,10</sup> laparoscopic varicocelectomy has been shown to be as effective as open surgery. Recently, many studies<sup>5,10,11</sup> comparing classic and modified Palomo techniques with varicocelectomy have been published as the laparoscopic procedures gained wider recognition. However, those studies generally preferred to focus on postoperative complications (eg, hydrocele formation, and others), recurrence, length of the operation, and testicular atrophy. There is no study in the literature that performs a comparison with regard to scrotal pain secondary to surgery in the early postoperative period. Therefore, we decided to conduct a study focusing on this aspect. Additionally, we compared the laparoscopic and microscopic subinguinal varicocelectomy methods with regard to the length of the operation and complications.

## MATERIALS AND METHODS

Forty patients who presented to our clinic because of pain, infertility, or both, and underwent left varicocelectomy, were included in the study after acquisition of their

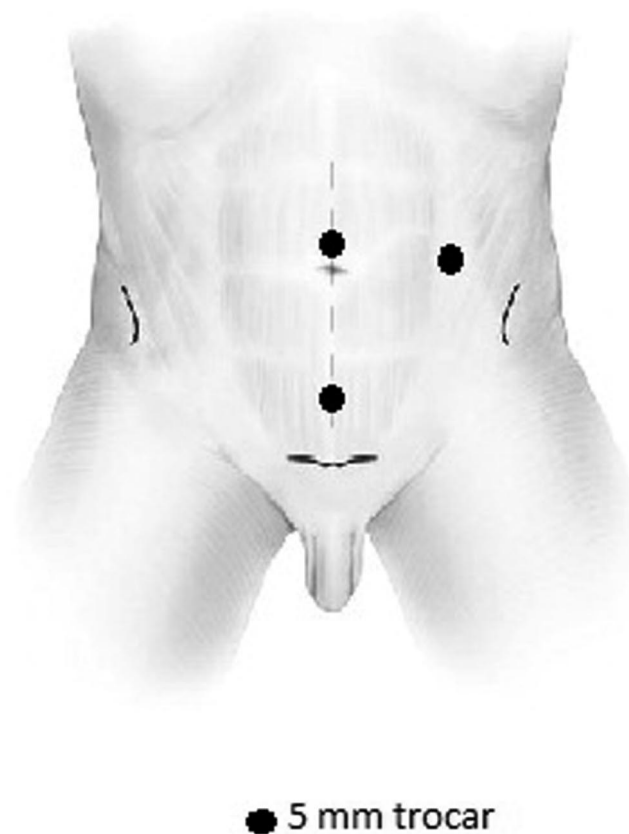
written informed consents and local Institutional Review Board approval was obtained. Preoperatively, color Doppler ultrasonography was performed on each patient to assess the degree of varicocele, investigate the presence of testicular atrophy, and determine the duration of reflux. Patients with bilateral or recurrent varicocele and cases with a disease that could lead to scrotal pain other than varicocele (eg, inguinal hernia, spermatocele, and others) were excluded from the study.

According to the patients' choice, they were split into 2 groups relative to the type of operation. Group I comprised 20 patients who had undergone microscopic subinguinal varicocelectomy, and Group II comprised 20 patients who had undergone laparoscopic varicocelectomy.

The operation on patients while under general anesthesia in Group I was started by performing a subinguinal incision at the level of the external inguinal ring. The incision was deepened, Camper and Scarpa fasciae were opened, and spermatic cord was identified. Spermatic cord and the testicle were brought out by a Babcock clamp. Gubernacular and external spermatic perforator veins were isolated and divided. Following placement of the testicle back into the scrotum, the spermatic cord was evaluated by using a surgical microscope. Spermatic fascia was opened, testicular arteries and lymphatics were preserved, and dilated veins were isolated and ligated with 3/0 or 4/0 silk and severed. Following closure of the spermatic fascia, the skin incision was closed and the procedure was ended.

Patients in Group II were placed in a supine and mild Trendelenburg position while under general anesthesia. After confirming the empty state of the bladder, we introduced 3 trocars of 5-mm thickness into the abdomen through the points shown in **Figure 1**. The trocar over the abdomen was used for insufflation and as a camera port. Visualization was achieved by using 30° optics. By using cutting and grasping tools introduced through the other 2 trocars, the peritoneal leaf was elevated over the spermatic cord from a point proximal to the inguinal ring. The peritoneal space was enlarged along the testicular vessels towards the inferior and inner aspect, and the first vessels observed at this level were severed with a metal clipper. Thereafter, while sparing the testicular artery and lymphatics, all remaining veins were cauterized individually. Following confirmation of hemostasis, trocars were removed. The opened fascia over the abdomen was closed. All 3 incisions were closed with subcuticular sutures.

Both groups received first-generation cephalosporins for preoperative antibiotic prophylaxis and the parenteral



**Figure 1.** Trocar placement.

form of diclofenac sodium for postoperative analgesia. If needed, additional analgesic delivery was performed and its amount was recorded. Visual analogue score (VAS) was used for assessment of the severity of scrotal pain. The range of pain severity was scored between 1 and 10; patients were asked to score absence of pain as "0" and most severe pain as "10." Postoperative scrotal pain at 1, 3, and 7 days was noted by VAS scores. Discharged patients were reached via telephone and their follow-up data involving pain scores, requirement of additional analgesia, either for abdominal or scrotal pain, and time to return to normal activity were recorded. Moreover, length of operation and complications were noted, as well. Scrotal color Doppler ultrasonography was performed at 6-month and 1-year follow-ups, during which detection of any hydrocele formation or recurrence was recorded.

SPSS version 15.0 program was used for statistical analysis. Data are presented as mean  $\pm$  standard deviation. Results were evaluated by nonparametric tests (Mann-Whitney U, Friedman), because they were not normally distributed.  $P < .05$  was recognized as statistically significant.

**Table 1.**  
General Characteristics of 2 Groups

	Group I	Group II	P Value
n	20	20	
Mean age, year ( $\pm$ SD)	24.2 $\pm$ 3.4	25.1 $\pm$ 2.1	0.593
Varikose grade			
Grade II	12	14	
Grade III	8	6	
Presenting complaint			
pain	8	7	
infertility	12	13	
Mean operation time, min	38.6 $\pm$ 10.7	35.8 $\pm$ 9.5	0.249
Mean follow-up, months	12.3	11.4	0.313

## RESULTS

The mean age of patients was 24.2 $\pm$ 3.4 years in Group I and 25.1 $\pm$ 2.1 years in Group II. Twelve Group I patients had grade III varicocele, and 8 had grade II varicocele. In Group 2, 14 had grade III, whereas 6 had grade II varicocele. Eight of 20 patients who received open surgery had presented because of pain and 12 due to infertility. In the laparoscopy group, the presenting complaint was pain in 7 and infertility in 13 patients. Mean postoperative follow-up period for the patients was 12.3 and 11.4 months, respectively. General characteristics of patients were shown in **Table 1**.

The length of surgery was recognized as the duration between the insertion of the first trocar and closure of the incisions in the laparoscopic group, and the duration between initiation of the incision and the skin closure in the subinguinal varicocelectomy group. While mean length of operation was 35.8 $\pm$ 9.5 minutes in the laparoscopic group, it was 38.6 $\pm$ 10.7 minutes in the other group ( $P > .05$ ). Mean length of operation was 48.4 minutes in the first 5 laparoscopy patients and 31.6 minutes in the following 15 laparoscopy patients. Postoperative requirement for additional analgesia was observed at 3.5 $\pm$ 1.8 days in Group I and 1.7 $\pm$ 0.9 days in Group II ( $P = .034$ ). Early and late period complications are shown in **Table 2**. Scrotal emphysema was observed in 5 patients in the laparoscopy group, and it resolved spontaneously within 24 hours to 48 hours. Recurrence of varicocele was observed in 10% of patients (n=2) in Group II and 5% (n=1) of patients in Group I. Also, hydrocele occurred in 2 patients in Group II and 1 patient in Group I.

**Table 2.**  
Early and Late Period Complications

	Microscopic Subinguinal Varicocelectomy (n, %)	Laparoscopic Varicocelectomy (n, %)
Wound infection	1 (5%)	0
Hematoma	0	0
Testicular atrophy	0	0
Orchitis	0	1 (5%)
Scrotal edema	3 (15%)	1 (5%)
Hydrocele	1 (5%)	2 (10%)
Recurrence	1 (5%)	2 (10%)
Scrotal emphysema	0	5 (25%)

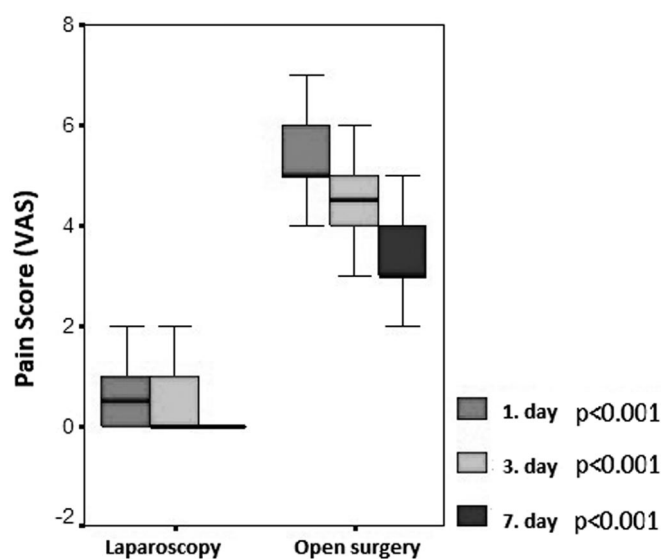
Postoperative early period VAS scores for scrotal pain in both groups are shown in **Table 3** and **Figure 2**. VAS scores were significantly lower in the laparoscopic group at postoperative days 1, 3, and 7, compared with the other group ( $P < .001$ ). Although there was no significant difference between the VAS scores on postoperative days 1 and 3 in the laparoscopy group, the VAS score at 7 days was significantly lower than the preceding 2 scores ( $P = .013$ ). VAS score demonstrated a significant decrease in the late postoperative days ( $P = .042$ ). Time to return to normal activity was statistically significantly shorter in the laparoscopic group (6.8 $\pm$ 3.4 vs. 3.7 $\pm$ 2.1 days) ( $P = .028$ ). One of the laparoscopic varicocelectomy patients was obliged to suspend daily activities again after returning to normal activities because of detection of orchitis. A patient who received microscopic inguinal varicocelectomy reported persistence of the preoperative pain at the 6-month follow-up (12.5%). In the other group, 1 patient had persisting pain as well (14.2%), and there was no statistically significant difference between the groups ( $P > .05$ ). The preoperative pain was resolved in 13 (86.7%) of 15 patients who underwent surgery due to pain.

## DISCUSSION

Various surgical methods are available for varicocele treatment. The first surgical treatment of varicocele was performed by Celsus in the first century by performing orchectomy on a patient with a testicular atrophy. Among the currently popular varicocelectomy methods, we can mention the Ivanissevitch technique, Palomo technique, subinguinal (microscopic) varicocelectomy, laparoscopic varicocelectomy, and sclerotherapy. The authorities have not yet agreed upon a single most-effective and least-invasive

**Table 3.**  
Postoperative Scrotal Pain Scores of the 2 Groups

	Microscopic Subinguinal Varicocelectomy (n=20)	Laparoscopic Varicocelectomy (n=20)	P Value
Requirement of additional analgesia	3.5 ±1.8	1.7 ±0.9	.034
1. day pain score (VAS)	5.20 ±1.14	0.70 ±0.82	<.001
3. day pain score (VAS)	4.60 ±0.97	0.60 ±0.84	<.001
7. day pain score (VAS)	3.50 ±0.97	0.10 ±0.32	<.001



**Figure 2.** Postoperative scrotal pain scores of the 2 groups (VAS).

method. In the present study, we aimed to compare laparoscopic and microscopic subinguinal varicocelectomy methods with regard to parameters, such as postoperative scrotal pain, length of surgery, and complications.

Varicocelectomy can be performed due to scrotal pain in select cases where medical treatment fails or patients exhibit specific pain complaints. Previous studies have shown the successful effects of surgery on pain relief. Peterson et al<sup>13</sup> reported the success rate of high ligation for pain relief as 86%. Yaman et al<sup>14</sup> found the same rate in their own study as 88%. Yenyol et al<sup>15</sup> conducted a study where they used inguinal and subinguinal methods and obtained results similar to the ones mentioned above. In another study, the success rate for pain relief in microscopic subinguinal varicocelectomy was reported as 85.6%.<sup>16</sup> In our study, the success rates for pain relief in patients who had presented with preoperative scrotal pain, were similar to the results in the literature, both in

the microscopic and laparoscopic groups (87.5% and 85.7%, respectively).

Previous studies on the varicocele-pain relationship have been conducted in a way that we mentioned above. Only a few studies focus on postoperative pain secondary to surgery. Because no pain scale has been used in those analyses, we do not regard their results as objective assessments on this subject. Bebars et al<sup>17</sup> compared open surgery and laparoscopic varicocelectomy groups in their study, which comprised 193 patients. They performed the postoperative pain assessment based on the need for narcotic analgesia. Because all the patients in the open surgery group needed one or more narcotic analgesics, the same rate was only 13% for the laparoscopy group. Koyle et al<sup>18</sup> conducted a study of 103 varicocele patients including children and adolescents by applying varicocelectomy via the laparoscopic Palomo method and determined postoperative requirement of analgesia only for the first 48 hours.

Contrary to the few studies on this subject, our study used an objective assessment criterion. Moreover, our study showed that the laparoscopic varicocelectomy method was more comfortable for patients in terms of the early postoperative scrotal pain period compared to the microscopic subinguinal varicocelectomy. This comfort means earlier return to normal activity. Bebars et al<sup>17</sup> found the mean time to return to normal activity as 4.5 days in the laparoscopy group and 8.9 days in the open surgery group. In another study, mean time to return to normal activity was 9.3 (range, 5 to 23) days in 284 patients who received microscopic subinguinal varicocelectomy.<sup>16</sup> Our results were parallel to those in the literature. In the current study, the time to return to normal activity was shorter in the laparoscopic varicocelectomy group than in the open surgery group.

Many studies report the length of operations. Shamsa et al<sup>19</sup> compared 3 varicocelectomy methods on 3 groups comprising 30 patients each. Mean length of operation was 30.0±5.5



minutes in the laparoscopic group,  $27.0 \pm 3.5$  minutes in the subinguinal varicocelectomy + general anesthesia group, and  $38.0 \pm 1.8$  minutes in the subinguinal varicocelectomy + local anesthesia group. In the Nuhoglu et al study,<sup>20</sup> mean length of surgery was  $24 \pm 4.5$  minutes for inguinal varicocelectomy and  $38 \pm 6.4$  minutes for microscopic subinguinal varicocelectomy. Because open surgery has been performed with the same techniques and equipment for a long time, it is normal that the length of surgery is similar in most of the studies reported in the literature. However, currently, the laparoscopic method appears to be gaining wide acceptance along with the accumulation of experience that results in the decreased length of surgery compared with the previous durations.

In a study conducted on 193 patients that is supportive of this fact, mean length of surgery was 38.5 minutes for the unilateral varicocelectomy and 69.5 minutes for the bilateral varicocelectomy in the open surgery group, and no change was observed in the durations over time. However, in the laparoscopy group, mean length of surgery for unilateral cases was 69.8 minutes in the first 20 cases and 42.3 minutes for the following cases, whereas it was 92.5 and 71.8 minutes for the bilateral cases, respectively.<sup>17</sup> Similarly, among 6 patients who received single-port laparoscopy on which there is little experience, mean length of operation was 73.3 minutes. In other words, it was longer than those of frequently applied techniques.<sup>21</sup> In our study, mean length of surgery in the laparoscopy group decreased substantially as experience increased. However, there was no reduction with regard to length of surgery in the open surgery group. In the current study, mean length of operation for both techniques were found to be consistent with the results in the literature.

Many of the studies focusing on varicocelectomy methods have determined various complications. Çayan et al<sup>22</sup> conducted a meta-analysis including results of 107 previous studies, to determine the best varicocelectomy technique for infertile patients in 2009. In this report, the hydrocele formation rate was 8.24% for the Palomo technique, 0.44% for microscopic varicocelectomy, 2.84% for laparoscopy, and 7.3% for macroscopic inguinal (Ivanissevitch) or subinguinal varicocelectomy. In another study, Bebars et al<sup>17</sup> compared open varicocelectomy and laparoscopic varicocelectomy methods. Among 65 open varicocelectomy patients, there was wound erythema in 6 (9.2%), wound infection in 1 (1.5%), and hydrocele in 3 (4.6%) cases. Among 128 laparoscopic varicocelectomy patients, 3 (2.3%) had wound erythema, 1 (0.8%) had wound infection, and 3 (2.3%) had hydrocele formation. Moreover, scrotal edema was observed only in 3 (2.3%) patients in

the laparoscopic group, whereas it was found in 11 (17%) patients in the open surgery group. In the study of Shamsa et al,<sup>19</sup> hydrocele was determined in 1 (3.3%), orchitis was determined again in 1, and scrotal edema was determined in 4 (13.3%) cases; there was no hematoma or wound infection. As the subinguinal varicocelectomy + local anesthesia group demonstrated hematoma in 1 (3.3%) patient, the subinguinal varicocelectomy + general anesthesia group displayed scrotal edema (10%) in 3, orchitis in 1 (3.3%), and wound infection in 3 (10%) patients. In our study, the most common complication in the microscopic open surgery group was scrotal edema, whereas it was scrotal emphysema in the laparoscopic group, which resolved spontaneously in all patients.

Another issue that can be encountered following the varicocelectomy procedure is the recurrence of varicocele. In the literature, there are many studies on this subject. In the meta-analysis of Çayan et al<sup>22</sup> including 107 studies, recurrence rates for each method were outlined. In this study, recurrence rate was 14.97% for the Palomo technique, 1.05% for microscopic varicocelectomy, 4.6% for laparoscopic varicocelectomy, 12.7% for the macroscopic inguinal method, and 2.63% for the macroscopic subinguinal method. In our study, the recurrence rate was higher in the laparoscopic group than in the open surgery group, which was a result consistent with the related literature.

## CONCLUSION

The best method in varicocele treatment is yet a contentious issue. Recently, although microscopic subinguinal varicocelectomy appears to be the most prominent technique, laparoscopic varicocelectomy seems to be gaining in popularity as well. Less postoperative scrotal tenderness that enables earlier return to normal activity is the main advantage of this method. Moreover, smaller incision scars due to use of small-scale tools can be mentioned among its other favorable properties. Although laparoscopic varicocelectomy is known as the preferred method in bilateral varicocele cases, obese individuals, and patients with a history of previous inguinal surgery, the laparoscopic method can be a good alternative for patients desiring an earlier return to normal activity. However, the principal disadvantage of laparoscopic varicocelectomy is the high rate of hydrocele formation. In this regard, there is a need for new studies with better visualization of the lymphatic system. We believe that if this problem can be solved, laparoscopic varicocelectomy will be the gold standard in varicocele treatment.

## References:

1. Witt MA, Lipshultz LI. Varicocele: a progressive or static lesion? *Urology*. 1993;59:613–616.
2. Zini A, Girardi SK, Goldstein M. Varicocele. In: Wayne J.G. Hellstrom, ed. *Male Infertility and Sexual Dysfunction*. New York: Springer-Verlag; 1997;201–218.
3. Madgar I, Weeissenberg R, Lunenfeld B, Karasik A, Goldwasser B. Controlled trial of high spermatic vein ligation for varicocele in infertile men. *Fertil Steril*. 1995;63:120–124.
4. Goldestein M, Gilbert BR, Dicker AP, Dwosh J, Gnecco C. Microsurgical inguinal varicocelectomy with delivery of the testis: An artery and lymphatic sparing technique. *J Urol*. 1992;148:1808–1811.
5. Hassan JM, Adams MC, Pope JC, Demarco RT, Brock JW. Hydrocele formation following laparoscopic varicocelectomy. *J Urol*. 2006;175:1076–1079.
6. Kocvara R, Dvoracek J, Sedlacek J, Dite Z, Novak K. Lymphatic sparing laparoscopic varicocelectomy: a Microsurgical repair. *J Urol*. 2005;173:1751–1754.
7. Misseri R, Gershbein AB, Horowitz M, Glassberg KI. The adolescent varicocele. II: the incidence of Hydrocele and delayed recurrent varicocele after Varicocelectomy in a long-term follow-up. *BJU Int*. 2001;87:494–498.
8. Schlegel PN, Goldstein M. Anatomical approach to varicocelectomy. *Semin Urol*. 1992;10:242.
9. Donovan JF, Winfield HN. Laparoscopic varix ligation. *J Urol*. 1992;147:77–81.
10. Esposito C, Monguzzi GL, Gonzalez-Sabin MA, et al. Laparoscopic treatment of pediatric varicocele: A multicenter study of the Italian society of video surgery in infancy. *J Urol*. 2000;163:1944–1946.
11. Kocvara R, Dolezal J, Hampl R, et al. Division of lymphatic vessels At varicocelectomy leads to testicular oedema And decline in testicular function according to the LH-RH analogue stimulation test. *Eur Urol*. 2003;43:430–435.
12. Spink MS, Lewis GL. *Albucasis on surgery and instruments*. Berkeley: University of California Press; 1973;438.
13. Peterson AC, Lance RS, Ruiz HE. Outcomes of varicocele ligation done for pain. *J Urol*. 1998;159:1565–1567.
14. Yaman O, Ozdiler E, Anafarta K, Gögüs O. Effect of microsurgical subinguinal varicocele ligation to treat pain. *Urology*. 2000;55:107–108.
15. Yenyol CO, Tuna A, Yener H, Zeyrek N, Tilki A. High ligation to treat pain in varicocele. *Int Urol Nephrol*. 2003;35:65–68.
16. Altunoluk B, Soylemez H, Efe E, Malkoc Ö. Duration of preoperative scrotal pain may predict the success of microsurgical varicocelectomy. *Int Braz J Urol*. 2010;36:55–59.
17. Bebars GA, Zaki A, Dawood AR, El-Gohary MA. Laparoscopic versus open high ligation of the testicular veins for the treatment of varicocele. *JSLs*. 2000;4:209–213.
18. Koyle MA, Oottamasathien S, Barqawi A, Rajimwale A, Furness PD. Laparoscopic Palomo varicocele ligation in children and adolescents: results of 103 cases. *J Urol*. 2004;172:1749–1752.
19. Shamsa A, Mohammadi L, Abolbashari M, Shakeri MT, Shamsa S. Comparison of open and laparoscopic varicocelectomies in terms of operative time, sperm parameters, and complications. *Urol J*. 2009;6:170–175.
20. Nuhoğlu B, Göçen A, Ersoy E, Ayyıldız A, Fidan V, Germiyanoglu C. Subinguinal mikrocerrahi ve inguinal varikoselektominin semen ve hormon parametrelerine etkilerinin karşılaştırılması: 1 yıllık izlem. *Türk Üroloji Dergisi*. 2004;30:302–307.
21. Lee SY, Kim YT, Park HY, Lee TY, Park SY. Initial experience with laparoendoscopic single-site surgery by use of a homemade transumbilical port in urology. *Korean J Urol*. 2010;51:613–618.
22. Çayan S, Shavakhabov S, Kadioğlu A. Treatment of palpable varicocele in infertile men. A meta-analysis to define the best technique. *J Androl*. 2009;30:33–40.