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The effect of specimen extraction site on patient satisfaction in laparoscopic nephrectomy

Laparoskopik nefrektomide spesmen çıkarma bölgesinin hasta memnuniyetine etkisi

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ÖZET

Amaç: Bu çalışmada laparoskopik nefrektomi sonrası spesmen çıkan bölgedeki ağrı, yaşam kalitesi ve hasta memnuniyeti değerlendirildi.

Gereç ve Yöntemler: Kliniğimizde 2016-2017 yılları arasında laparoskopik nefrektomi yapılan 52 hasta çalışmaya dahil edildi. Hastaların demografik ve cerrahi özellikleri kaydedildi. Hastalar spesmen çıkarımında kullanılan insizyona göre üç grupta değerlendirildi: port yeri genişletilenler (PYG) (n= 26), Gibson (n = 10) ve Pfannenstiel (n = 16) insizyonları. Gruplar görsel analog skala(VAS) ile ölçülen postoperatif ağrı skorları, komplikasyonlar ve yaşam kalitesi skalasına göre ölçülen hasta memnuniyeti açısından karşılaştırıldı.

Bulgular: PYG, Gibson ve Pfannenstiel gruplarında 3. saat VAS ortalaması sırasıyla 2.46 ± 2.06, 4.70 ± 2.90 ve 2.50 ± 2.47 idi (p>0.005). PYG, Gibson ve Pfannenstiel gruplarının ortalama 9. saat VAS ortalamaları sırasıyla 2.53 ± 2.06, 2.80 ± 2.97 ve 2.50 ± 2.12 idi (p>0.005). PYG, Gibson ve Pfannenstiel grupları için 72 saatlik VAS ortalamaları sırasıyla 0.53 ± 0.76, 1.60 ± 1.95 ve 1.18 ± 1.51 idi (p>0.005). 3, 9, 24 ve 72. saatlerde ortalama toplam VAS sırasıyla 2.90 ± 2.40, 2.57 ± 2.23, 1.94 ± 2.13 ve 0.94 ± 1.34 idi. Hastaların doldurduğu genel yaşam kalitesi formlarının(KF-36) karşılaştırmasında alt tiplerin hiçbirinde anlamlı istatiksel fark saptanmadı. Cerrahi örnek çıkarım yöntemleri arasında ağrı ve hasta memnuniyeti açısından anlamlı fark yoktu (p> 0.05). Pearson korelasyon testine göre, ameliyat sonrası ağrıyı etkileyen tek önemli faktör uzamış operasyon idi (p = 0.039).

Sonuç: Farklı spesmen çıkarım bölgeleri morbiditeyi değiştirmez. Spesmen çıkarım yerinden bağımsız olarak laparoskopik nefrektomide hasta memnuniyeti yüksektir.

Anahtar Kelimeler: *Laparoskopi, nefrektomi, ağrı, memnuniyet*

ABSTRACT

Objective: This study aimed to evaluate patient satisfaction and postoperative pain in the location of specimen extraction as well as the quality of life following laparoscopic nephrectomy.

Material and Methods: A total of 52 patients who underwent laparoscopic nephrectomy in our clinic between 2016 and 2017 were included in the study. Demographic and surgical characteristics were documented. Patients were evaluated in three groups according to incision used for specimen extraction: expanded port site (EPS)(n=26), Gibson(n=10) and Pfannenstiel(n=16) incisions; patients were analyzed in

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terms of postoperative pain scores measured by visual analog scale(VAS), complications and patient satisfaction measured by the quality of life scale.

Results: The mean of the 3rd-hour VAS for EPS, Gibson, and Pfannenstiel groups were 2.46±2.06, 4.70±2.90, and 2.50±2.47(p>0.05), respectively. The mean 9th-hour VAS averages for EPS, Gibson, and Pfannenstiel groups were 2.53±2.06, 2.80±2.97, and 2.50±2.12, respectively(p>0.05). For EPS, Gibson, and Pfannenstiel groups, 72-hour VAS averages were 0.53±0.76, 1.60±1.95, and 1.18±1.51, respectively(p>0.05). The mean total VAS at the 3rd, 9th, 24th and 72nd hours were 2.90±2.40, 2.57±2.23, 1.94±2.13 and 0.94±1.34, respectively. In the comparison of life quality scale forms(SF-36) filled by the patients, no statistically significant difference was found in any of the subtypes. There was no significant difference in surgical specimen extraction in terms of pain and patient satisfaction(p>0.05). According to the Pearson correlation test, the prolonged operation was the only important factor affecting postoperative pain(p=0.039).

Conclusion: Different specimen extraction methods do not alter morbidity. Patient satisfaction is high, independent from the specimen extraction method in laparoscopic nephrectomy.

Keywords: *Laparoscopy, nephrectomy, pain, satisfaction*

INTRODUCTION

Laparoscopic surgical techniques were initially applied in the 1970s in gynecologic interventions (1). The first laparoscopic nephrectomy was performed by Ralph Clayman et al. in the year 1990 (7). This success was a milestone in minimally invasive surgery that offered a solution in the removal of a solid organ using a few small incisions. Technological developments allowed the use of laparoscopic methods in many surgical interventions (2). Currently, laparoscopic radical nephrectomy has become the standard approach to stage 1- 2 kidney tumors due to renal cell carcinoma. (3,4). However, in cases with stage 1 tumors, and stage 2 tumors suitable for surgical intervention, partial nephrectomy is highly recommended in guidelines. Besides, guidelines strongly recommend laparoscopic or robotic hand-assisted nephrectomy for live donor nephrectomy (5). For simple nephrectomy, there are publications indicating that laparoscopic nephrectomy is the gold standard. Compared to open surgery, laparoscopic surgery has brought with it the advantages of a smaller incision, less postoperative pain, earlier mobilization, shorter operative and hospitalization time, and decreased mortality and morbidity (6). It is a fact that pain is intense, especially after flank incision. Although pain is less common in laparoscopic nephrectomy, is it possible to reduce this further? This study aimed to evaluate patient satisfaction, postoperative pain in the location of specimen extraction, and effect on the quality of life following laparoscopic nephrectomy.

MATERIALS AND METHODS

The study included a total of 52 patients who underwent laparoscopic nephrectomy in our clinic between December 2016 and February 2017. Our study is a prospective randomized study. Detailed medical history of all patients was documented before the study. Age, gender, body mass index, smoking, surgical history, ongoing chronic illnesses, present diagnosis and cause of nephrectomy, and kidney dimensions measured with tomography and ultrasound of all patients were documented before the operation. Patients who underwent laparoscopic nephrectomy in the specified period were included in the study. Block randomization was applied to the patients. All patients were informed about the study. Patients were informed on the study and written consent was obtained.

The transperitoneal technique was used as a laparoscopic method in all patients. After the operation, operation time, estimated blood loss, location of specimen extraction, incision size, specimen extraction time, number and size of trochars used, and amount of carbon dioxide (CO_2) use was determined. After nephrectomy, nephrectomy material was placed in an organ bag as a whole (malignancy or donor nephrectomy) or in pieces (simple nephrectomy) and extracted with Gibson or Pfannenstiel incisions. Intravenous analgesics were applied to the patients in the postoperative early recovery unit. In the postoperative period, a visual analog scale (VAS) was used to monitor pain 3 hours, 9 hours, 24 hours, and 72 hours after surgery.

Postoperative hospitalization time, and any complications that developed during this period was taken note of. Diclofenac sodium was administered as an analgesic during hospitalization period as needed, and cumulative doses were included in the study. The development of incisional herniation and patient satisfaction were questioned in a one-year postoperative follow-up. Short form of life quality scale (SF-36) was used to evaluate patient satisfaction. Data on perioperative pain and additional comorbidity following laparoscopic operation was collected and statistically analyzed for evaluation. The study was approved by the Ethics Committee of Health Sciences University, Türkiye Yüksek İhtisas Training and Research Hospital in September 2016 with the 3102 number. The study was prepared in accordance with the Helsinki Declaration Criteria.

Statistical Analysis

Statistical analysis of the data was performed using the IBM SPSS 20.0 (Armonk, NY, USA) program. Data were summarized as mean ± standard deviation. The generalized estimating equation (GEE) method was used for statistical analysis. The value of $p<0.05$ was accepted as statistically significant.

The generalized estimating equation was used to evaluate the effect of clinical variables (age, BMI, size of the kidney, surgical history, gender, surgical extraction site, the amount of gas used, duration of surgery, extraction time) on changes in VAS score over time. The effect of analgesic dose on the change in VAS score over time was initially assessed and found insignificant. Therefore, the effect of other clinical variables on change in VAS score over time was modeled independently from analgesic dose. Kruskal-Wallis test was used for intergroup evaluation of VAS score. One-Way ANOVA test was used for the quality of life scores measured at the postoperative 1st year.

RESULTS

Laparoscopic nephrectomy was performed on 52 patients (33 males, 19 females) between December 2016 and February 2017. While 34 of the cases were left, 18 were right-sided laparoscopic nephrectomy. The mean follow-up period was 16±4.67 months. The mean patient age was 51.5±16.2 years. While 31 patients were primary cases, 21 had a history of previous abdominal surgery. Surgical history was not found to have a statistically significant effect on VAS score change over time ($p>0.05$). The mean body mass index (BMI) was 27.4±5.1 kg/m2. BMI did not have a significant effect on the change in VAS score over time ($p>0.05$). Donor nephrectomy was performed in 13 patients, radical nephrectomy due to renal mass in 16, and simple nephrectomy in 23. Patients were divided into three groups based on specimen extraction site: 26 EPS, 10 Gibson, and 16 Pfannenstiel incisions were used to extract nephrectomy material. The mean operation time was 104.9±35.6 minutes. According to the obtained data, operation time had a significant effect on VAS score change over time ($p=0.039$) and every 10-minute extension of operation increased VAS score by 1.12 units. The mean intraoperative hemorrhage amount was 80.1±64.8 cc. Mean incision size was 3.2±1.72cm in EPS, 7.3±2.49cm in Gibson incisions, and 7.78±1.26cm in Pfannenstiel incisions. Mean extraction time was 10.1±7.56 min in EPS, 8.5±2.75 min in Gibson incisions, and 9.75±5.86 min in Pfannenstiel incisions. Incision size and extraction time had no statistically significant effect on the VAS score change over time ($p>0.05$). Amount of used CO2 gas was 145.5±84.7 L in EPS, 124.3±47.6 L in Gibson, and 135.7±75.2 L in Pfannenstiel, and measured as mean 138.4±75 L. Amount of used gas had no statistically significant effect on VAS score change over time ($p>0.05$).

Postoperative hospitalization time was 4.0±2.26 days in EPS, 6.2±4.34 days in Gibson, and 4.12±1.62 days in Pfannenstiel, and was mean 4.5±2.7 days. The mean dose of administered diclofenac sodium per patient during hospitalization was 201.44±196.75 mg. Mean analgesic dose had no significant effect on the change in VAS score over time ($p=0.1013$). There was no statistically significant difference in specimen extraction sites according to the postoperative analgesic dose ($p>0.05$).

The mean of the 3rd-hour VAS for EPS, Gibson, and Pfannenstiel groups was 2.46 ± 2.06, 4.70 ± 2.90, and 2.50 ± 2.47, respectively. The mean 9th-hour VAS averages for EPS, Gibson, and Pfannenstiel groups were 2.53 ± 2.06, 2.80 ± 2.97, and 2.50 ± 2.12, respectively. For EPS, Gibson, and Pfannenstiel groups, 72-hour VAS averages were 0.53 ± 0.76, 1.60 ± 1.95, and 1.18 ± 1.51, respectively. The mean total VAS at the

3rd, 9th, 24th and 72nd hours were 2.90 ± 2.40, 2.57 ± 2.23, 1.94 ± 2.13 and 0.94 ± 1.34, respectively. Mean and total VAS scores 3, 9, 24, and 72 hours after operation according to incision sites were measured as demonstrated in Table 2. The incision site had no statistically significant effect on change in the VAS score over time (p>0.05).

One patient developed rectus sheath hematoma due to port inlet and pulmonary thromboembolism and conservatively monitored; the patient responded to treatment and was discharged on postoperative day 17. Another patient had elevated cardiac enzymes in the postoperative early period. Cardiology clinic was consulted, the patient was initiated and responded to medical treatment and discharged on postoperative day 10. Another patient developed wound infection at the incision site and recovered with medical treatment.

Patients were called for follow-up at the end of one year. Complaints due to surgery and herniation at incision sites were questioned. Two patients developed incisional herniation in which one was Gibson incision and the other was Pfannenstiel incision. While four patients expressed dissatisfaction with the operation (pain, swelling in the surgical site, tightness in the abdomen) (2 Gibson, 2 Pfannenstiel), the remaining 48 patients expressed satisfaction and content quality of life following the operation. In comparison of SF-36 forms, a statistically significant difference was not found between any of the subtypes. (Table 2)

Table 1. Mean VAS scores according to incision sites

Incision site	VAS 3 hours	VAS 9 hours	VAS 24 hours	VAS 72 hours
EPS	2.46±2.06	2.53±2.06	1.46±1.94	0.53±0.76
Gibson	4.70±2.90	2.80±2.97	2.80±2.29	1.60±1.95
Phannenstiel	2.50±2.47	2.50±2.12	2.18±2.25	1.18±1.51
Total	2.90±2.40	2.57±2.23	1.94±2.13	0.94±1.34
p Value	>0.05	>0.05	>0.05	>0.05

VAS: visual analogue scale , **EPS:** expanded port site
Kruskal-Wallis test

Table 2. Comparison of the general quality of life scores of patients in the first postoperative year

General quality of life (SF-36)	EPS	Gibson	Phannenstiel	p Value
General health	63.12±13.7	67.31±17.2	62.57±14.6	>0,05
Physical function	74.25±14.6	71.17±16.4	75.26±12.8	>0,05
Emotional well-being	68.54±13.5	67.83±18.9	70.13±15.8	>0,05
Social function	88.23±9.2	84.57±12.6	86.47±13.5	>0,05
Limitation due to physical problems	79.74±14.7	81.37±12.9	77.98±15.7	>0,05
Limitations due to emotional problems	86.71±10.8	90.02±8.4	88.92±10.1	>0,05
Pain	72.12±13.6	75.29±13.2	77.23±10.7	>0,05
Energy/Fatigue	61.23±16.7	63.34±17.4	64.68±16.7	>0,05

EPS: expanded port site
One-Way ANOVA test

DISCUSSION

Laparoscopic nephrectomy has better pain outcomes and patient satisfaction than open procedures. It is reported that laparoscopy is more comfortable for patients despite the specific additional risks associated with the gas used during the procedure, patient position, and especially shoulder compression (7).

Laparoscopic nephrectomy seems superior to open surgery in terms of hospitalization time, recovery period, postoperative analgesic need, and cosmetic results (8-13). In the early application of laparoscopic

surgery, intestinal wounds or port location burns would develop due to thermal injury from monopolar instruments. These complications have decreased over time with the use of bipolar instruments or better insulated monopolar instruments. In addition, interest in the use of instruments such as the vascular endo stapler, harmonic shear, and intracorporeal endoclip has increased. Laparoscopy-related limitations are also present. These include the expenses and high learning curve of laparoscopic interventions. Experienced centers in developed countries accept laparoscopic nephrectomy as the standard treatment in T1 and T2 renal cell cancer and simple nephrectomies (8,14).

Mean operation time was reported as 4 hours in 266 patients who underwent transperitoneal LRN (15). While operation time was longer in initial interventions, it has become relatively shorter due to increased experience. Dunn et al. reported mean operation time as 5.5 hours, while Barett et al. reported 2.9 hours. Mean operation time was 220 min in initially reported series, which decreased to 130 min with increased experience. Dunn et al. reported that the length of the last 10 operations performed with the same team had reduced almost in half (16). In our series, this operation length was initially 105.4±35.6 minutes and decreased to 80 minutes with clinical experience. This study also demonstrates that operation time shortens along with the learning curve.

Various studies on specimen extraction site, patient comfort, and postoperative morbidity following laparoscopic nephrectomy have been conducted. Evaluation of differences between muscle-splitting and muscle-cutting incisions was attempted. Britton et al. conducted a study on 150 patients divided into two groups according to specimen extraction site: Pfannenstiel and EPS. The Pfannenstiel incision group had shorter postoperative morphine need (23.7 vs 47.3 mg), shorter hospitalization period (2.84 vs 3.37 days), and less intraoperative blood loss (130 vs 405 ml) compared to the EPS group (17). Various studies have indicated that Pfannenstiel incision is superior to other incisions according to both cosmetic results and morbidity (18,19). Similar studies have reported that muscle-cutting incisions are more likely to cause incisional herniations compared to muscle-splitting incisions (20,21). However, Gill et al. reported that there was no significant difference between muscle-splitting (Pfannenstiel) and muscle-cutting (EPS and Gibson) incisions according to herniation development or postoperative pain following laparoscopic nephrectomy (22). Camargo et al. compared Pfannenstiel incision (46 patients) and muscle-cutting incision connecting two port sites (107 patients) and found that herniation did not develop in either incision site, only one patient developed ileus and another wound dehiscence (muscle-cutting group) (23).

It is wrong to believe the incision site is the only factor that affects the development of incisional herniation. It should be noted that it is multifactorial with some predisposing factors specific to the patient. History of abdominal surgery, obesity, kidney failure, postoperative infection, diabetes, steroid use, being over 50 years of age, and nutritional disorders are among the foremost factors (24). Two of the 52 patients in our study developed incisional herniation at the end of one year. One of these patients had specimen extraction with Pfannenstiel incision while Gibson incision was applied in the other. None of the 26 patients with expanded port site incision used in specimen extraction developed incisional herniation.

In our study, we observed that patients who have applied Pfannenstiel incision for specimen extraction had relatively less intraoperative bleeding compared to Gibson incision (29.4±24cc vs 40 44±58.7cc). Blood loss in EPS specimen extraction was 54.6±140cc. Studies have shown that blood loss is less compared to open surgery. One study collected data on 194 patients and determined that average blood loss per operation was 199 cc (15). All studies have generally shown that LRN has less blood loss compared to open surgery. In our study, mean blood loss was 80.1±64.8cc, and with increasing experience, this reduced to 40-60 cc in later operations.

LRN is reported to have a significant advantage in terms of hospitalization length. Gill et al. compared hospitalization length in laparoscopic and open surgery and reported mean durations as 1.4 and 5.8 days, respectively. Abbou et al. reported these values as 4.8 and 9.7 days (7). Mean postoperative hospitalization time was 4.9 days in Pfannenstiel incision, 8.3 in Gibson incision, and 5.1 days in EPS. The overall mean hospitalization time was 4.5±2.7 days in our study and was relatively longer than reported in the literature.

We believe late discharge was due to the socioeconomic status of our patients, in which most had arrived from a different city, and also the social reasons of patients undergoing donor nephrectomy. There was no statistically significant difference between the specimen extraction incisions according to the postoperative analgesic dose ($p>0.05$).

Many studies are reporting that laparoscopic nephrectomy achieves a higher quality of life scores than open nephrectomies. (25). However, there are few studies comparing incision site and quality of life in laparoscopic nephrectomy. In our study, in addition to the retroperitoneal and transperitoneal approach comparisons, different incisions of the same approach were also compared. (26). Our study showed that three different incision sites have no different effect on the quality of life in the transperitoneal approach.

CONCLUSION

Laparoscopic nephrectomy is increasingly preferred by surgeons because of short hospital stay, few complications, and good surgical outcomes, it is also a desirable procedure for patients because of its rapid discharge, good cosmetic results, low surgical morbidity, and quick return to daily activities. Despite the long learning curve, it is important that surgeons strive to do so. Different specimen extraction methods do not alter morbidity. Regardless of the specimen extraction method, patient satisfaction is at similar rates and higher than open surgery.

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