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Effects of Chronic Renal Failure on Surgical Outcomes of Laparoscopic Nephrectomy for Benign Diseases? A Comparative Study

Kronik Böbrek Yetmezliğinin Benign Hastalıklar Sebebiyle Yapılan Laparoskopik Nefrektomide Cerrahi Sonuçlar Üzerine Etkisi Var mı? Karşılaştırmalı Bir Çalışma

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What's known on the subject? and What does the study add?

It is known that chronic renal failure (CRF) patients come up with metabolic disturbances such as metabolic acidosis, increased risk of bleeding and a higher infection rate. However, data regarding outcome of laparoscopic nephrectomy in patients with CRF is scarce. Results of our study indicated that patients with chronic kidney disease can be counselled that surgical outcomes are comparable to patients with normal kidney function in laparoscopic nephrectomy.

Abstract

Objective: The aim of this study was to compare surgical outcomes of laparoscopic nephrectomy (LN) for benign diseases in patients with chronic renal failure (CRF) undergoing hemodialysis with their non-CRF counterparts.

Materials and Methods: A retrospective chart review of patients who underwent LN between 2008 and 2019 was conducted. Patients with CRF requiring hemodialysis were defined as group 1 whereas those with normal renal function prior to surgery were defined as group 2. Operative and postoperative parameters, such as complications, American Anesthesiologists Association scores, perioperative bleeding, length of stay and Hb drop, as well as demographic data, were reviewed.

Results: There were 22 patients in group 1 (13 females and 9 males) and 43 patients in group 2 (27 females and 16 males). There was no statistically significant difference between the groups with regards to mean intra operative bleeding (62.7±62.3 mL vs 55.9±54.7 mL, p=0.652) and Hb drop (0.9±0.8 g/dL vs 1.1±1.0 g/dL, p=0.475). The mean length of hospital stay was 3.8±1.0 days in group 1 whereas it was 3.4±1.3 days in group 2 (p=0.263). No conversion to open surgery was needed in the cohort. Complications were observed in 2 patients in group 1, both of which were blood transfusions and 3 patients in group 2 which were surgical site infection treated with iv antibiotics, delayed return of bowel movements and atelectasis that fully recovered after respiratory physiotherapy.

Conclusion: Surgical outcomes in LN for benign urological problems in patients with CRF are comparable to those in patients with normal kidney function.

Keywords: Laparoscopic, Nephrectomy, Complications, Chronic renal failure, Outcome

Öz

Amaç: Bu çalışmanın amacı kronik böbrek yetmezliği (KBY) nedeniyle hemodiyalize (HD) giren hastalarda benign sebeplerle yapılan laparoskopik nefrektomi (LN) sonuçlarını normal böbrek fonksiyonuna sahip hastalarla karşılaştırmaktır.

Gereç ve Yöntem: Kliniğimizde 2008 ile 2019 yılları arasında benign sebeplerle LN yapılmış olgular retrospektif olarak değerlendirilmiştir. KBY nedeniyle HD'ye giren hastalar grup 1, normal böbrek fonksiyonuna sahip hastalar grup 2 olarak adlandırılmıştır. Gruplar arası cerrahi ve cerrahi dışı parametreler (Amerikan Anestezistler Derneği skoru, perioperatif kanama, hastane yatış süresi, hemoglobin düşüşü ve demografik bilgiler) karşılaştırılmıştır.

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Bulgular: Grup 1'de 22 hasta mevcut (13 kadın, 9 erkek) iken grup 2'de 43 hasta (27 kadın, 16 erkek) vardı. İki grup arasında perioperatif kanama (62,7±62,3 mL vs. 55,9±54,7 mL, p=0,652) ve hemoglobin düşüşü (0,9±0,8 g/dL vs. 1,1±1,0 g/dL, p=0,475) açısından fark saptanmadı. Grup 1 için ortalama hastanede yatış süresi 3,8±1,0 gün iken grup 2'de 3,4±1,3 gün olarak bulundu (p=0,263). Çalışmaya dahil edilen hiç bir hastada açık cerrahiye geçiş olmadı. Grup 1'de 2 hastada komplikasyon (kan transfüzyonu) gözlenirken grup 2'de 3 hastada komplikasyon izlendi (iv antibiyotik ile tedavi edilen yara yeri enfeksiyonu, uzamış barsak hareketi geri dönüşü, fizyoterapi ile gerileyen atelektazi).
Sonuç: Benign sebeplerle yapılan LN açısından HD bağımlı KBY'li hastalar ile normal böbrek fonksiyonuna sahip hastalar arasında cerrahi sonuçlar açısından fark yoktur.
Anahtar Kelimeler: Laparoskopik, Nefrektomi, Komplikasyon, Kronik böbrek yetmezliği, Sonuç

Introduction

Laparoscopic nephrectomy (LN) is a globally accepted method for patients requiring nephrectomy for benign diseases. Advantages of laparoscopic surgery for benign diseases have been well defined in the literature (1). A subgroup of patients who undergo LN is chronic renal failure (CRF) patients. These patients undergo nephrectomy due to several causes (vesicoureteric reflux, urolithiasis, urinary tract infections, etc.), generally prior to renal transplantation in order to optimize graft survival. It is known that CRF patients come up with metabolic disturbances such as metabolic acidosis, increased risk of bleeding and a higher surgical site infection rate (2). However, data regarding outcomes of LN in patients with CRF is scarce (3).

The aim of this study was to compare surgical outcomes of LN in patients with CRF (undergoing hemodialysis) with those who have normal renal function, thus, evaluate if CRF would alter surgical outcomes.

Materials and Methods

After obtaining local ethics board approval (date: 29.04.2019, no.: 72300690-799), a retrospective chart review of patients, who underwent LN between 2008 and 2019, was conducted. Patients with incomplete data were excluded. Patients with CRF were defined as group 1, whereas their counterparts who have normal renal function (normal serum creatinine level) prior to surgery were defined as group 2. Group 2 consisted of consecutive patients who underwent LN for benign diseases. All patients in group 1 were under hemodialysis. Indications for nephrectomy and pre-operative serum creatinine levels were noted. Of note, the main reason for nephrectomy in group 1 was preparation for renal transplantation. Demographic data of the patients were retracted. Operative and postoperative notes such as American Anesthesiologists Association (ASA) scores, perioperative bleeding, length of hospital stay and hemoglobin (Hb) drop were also reviewed. Complications were assessed as per the Clavien-Dindo classification system (4).

A single surgeon (EÖ) performed the surgeries. All patients in group 1 received hemodialysis one day before the surgery. Operative technique of transperitoneal nephrectomy, in brief, was as follows; the patients were placed in a lateral decubitus position at 90 degrees to the operating table under general anesthesia. After mobilization of the colon, the ureter was found and control of the hilum was obtained. Specimens were extracted by extending the incision at the level of the more caudal port. In cases where bilateral nephrectomy was required, one additional port was used for the contralateral side.

Statistical Analysis

For statistical analysis, all numeric values were tested for normal distribution. Data are shown as mean ± standard deviation for those with normal distribution while median (range minimum and maximum) were used for those that does not. Non-parametric values were tested using the Wilcoxon signed-rank test, and parametric values were tested using the Student's t-test. Chi-square and Fischer's exact tests were executed for nominal variables. GraphPad software was used and a p value of <0.05 was considered statistically significant.

Results

Our cohort comprised a total of 65 patients out of 71. There were 22 patients in group 1 (13 females and 9 males) and 43 patients in group 2 (27 females and 16 males). There were no statistically significant differences in terms of gender ratio and age between the two groups. The mean pre-operative creatinine level in group 1 was 3.4±0.9 mg/dL and 0.7±0.07 md/dL in group 2 ($p<0.0001$). The mean Body Mass index (BMI) value in patients with CRF and those with normally functioning kidneys was 21.4±3.8 and 25.6±5.8, respectively (p=0.003). Median ASA score was 2 in group 1 (range 2-3) and 1 in group 2 (range 1-3). A total of 28 nephrectomies were performed in group 1 (left side in 10, right side in 6, and bilateral in 6 patients), while 24 patients underwent left nephrectomy and 19 patients underwent right nephrectomy in group 2 (Table 1).

In patients with CRF, indication for LN was non-functioning kidney due to urolithiasis (source of recurrent infection) in 13 patients and vesicoureteral reflux in 9. On the other hand, 26 patients underwent nephrectomy because of non-functioning kidney due to urinary stone disease, 9 patients due to unilateral reflux nephropathy, 6 patients due to ureteropelvic junction obstruction, 1 patient due to vascular thrombosis as well as another one for obstructing megaureter in group 2.

There was no statistically significant difference in duration of surgery between the groups (107.2±35.8 min vs 111.0±41.3 min, p=0.715). Also, there was no statistically significant difference between the groups with regards to mean intra operative bleeding (62.7±62.3 mL vs 55.9±54.7 mL, p=0.652) and Hb drop (0.9±0.8 g/dL vs 1.1±1.0 g/dL, p=0.475). The mean length of hospital stay was 3.8±1.0 days in group 1 and 3.4±1.3 days in group 2 (p=0.263). No conversion to open surgery was required in the cohort (Table 2).

Complications were observed in 2 patients in group 1 both of which were blood transfusions (grade 2). Of note, one of those patients underwent bilateral nephrectomy and the other has previously undergone percutaneous nephrolithotomy on the ipsilateral side. Further, complications were observed in 3 patients in group 2. One patient faced with surgical site infection treated with iv antibiotics (grade 2), one patient had delayed return of bowel movements (grade 1) and another one had atelectasis that fully recovered after respiratory physiotherapy (grade 1). Of these patients in group 2, the first patient had a previous open surgery for a ipsilateral kidney stone, the second one had total abdominal hysterectomy and bilateral salpingo-oopherectomy while the last one had a prior ureterorenoscopic intervention for the ipsilateral ureter, respectively (Table 3).

Table 1. Overview of the patients

	Group 1	Group 2	p
Number of patients (n)	22	43	-
Gender (Female/male)	9/13	27/16	-
Laterality (Left/right/bilateral)	10/6/6	24/19/0	-
Age (years)	34.2±17.1	38.6±16.6	0.329
Mean Body Mass index (kg/m^2)	21.4±3.8	25.6±5.8	0.003
Median ASA score (range)	2 (2-3)	1 (1-3)	-
Mean pre-operative serum creatinine (mg/dL)	3.48±0.94	0.77±0.07	>0.0001
Nephrectomy indications Urolithiasis Vesioureteric reflux Ureteropelvic junction obstruction Vascular thrombosis Obstructive megaureter	 13 9	 26 9 6 1 1	

ASA: American Society of Anesthesiologists

Table 2. Operative outcome of the patients

	Group 1	Group 2	p
Duration of surgery (mins)	107.27±35.85	111.07±41.37	0.715
Perioperative blood loss (mL)	62.7±62.3	55.9±55.7	0.652
Hb drop (mg/dL)	0.98±0.89	1.17±1.06	0.475
Length of hospital stay (days)	3.8±1.0	3.4±1.3	0.263

Hb: Hemoglobin

Table 3. Patients with complications

	Complication	Clavien grade
Group 1 #1 #2	 Blood transfusion Blood transfusion	 Grade 2 Grade 2
Group 2 #1 #2 #3	 Surgical site infection treated with Ab Delayed return of bowel movements Atelectasis recovered after physiotherapy	 Grade 2 Grade 1 Grade 1

Ab: Antibiotics

Discussion

LN has been an alternative to open nephrectomy since it was first introduced back in 1991 (5). Throughout the years, there have been major advancements in the technique, technology and indications. Currently, laparoscopy is the standard of care in patients with renal cell carcinoma when oncological outcomes would not be jeopardized (6). Also, many studies to date confirmed that LN is a viable alternative for benign diseases (1,7).

LN in patients with CRF, on the other hand, poses another challenge for urologists. Reduced platelet function, serum electrolyte abnormalities, anemia, hypertension, and vascular and cardiac problems are only a few problems that surgeons encounter when dealing with CRF patients especially when they are on dialysis (8,9).

A study by Sanli et al. (3) indicated that comparable surgical outcomes could be achieved in patients undergoing hemodialysis. Similarly, our results indicate no significant difference in complication rates between the groups. In addition, duration of surgery, Hb drop and length of stay was not statistically different from their counterparts with normal kidney function.

It should be remembered that nephrectomy for benign diseases are not always easy and several complications might be observed even if the patients have normally functioning kidneys (10). In a large group of CRF patients, Shoma et al. (11) evaluated results of native nephrectomy prior to renal transplantation that is very similar to group 1 in our series, and showed that only 4% of the cases required conversion to open surgery. Also, they have experienced 4 major complications i.e. pneumothorax, hematoma, colonic injury and bleeding. Additionally, it has been shown that learning curve had an impact on conversion to open surgery in LN in CRF patients (3). However, in our cohort, none of the patients required conversion.

Our comparative analysis also indicated that a lower BMI value may be observed in patients with CRF, which might be

a consequence of their metabolic status. Interestingly, 5 of 6 patients with complications in the whole cohort have had prior abdominal or ipsilateral urinary tract surgery. Although it is hard to establish firm conclusions, previous abdominal/urinary tract surgery seems to complicate LN, based on our results.

Limitations of our study include retrospective nature and relatively low patient number while comparative analysis of CRF patients and patients who have normal renal function is an important aspect of this study.

Conclusion

CRF does not increase operative or post-operative complication rates. Patients with CRF can be counselled that surgical outcomes are comparable to those in patients with normal kidney function in LN even though there is no standardized recommendation or guidelines to use laparoscopy for nephrectomy in benign urological problems.

Ethics

Ethics Committee Approval: The study were approved by the Ankara City Hospital of Local Ethics Committee (date: 29.04.2019, no.: 72300690-799).

Informed Consent: Retrospective study.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Concept: M.İ.D., E.Ö., A.M.B., Design: M.İ.D., A.M.B., Data Collection or Processing: M.İ.D., E.Ö., A.M.B., Analysis or Interpretation: M.İ.D., Literature Search: M.İ.D., Writing: M.İ.D.

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References

1. Fornara P, Doehn C, Friedrich HJ, Jocham D. Nonrandomized comparison of open flank versus laparoscopic nephrectomy in 249 patients with benign renal disease. Eur Urol 2001;40:24-31.
2. Gulati M, Meng MV, Freise CE, Stoller ML. Laparoscopic radical nephrectomy for suspected renal cell carcinoma in dialysis-dependent patients. Urology 2003;62:430-436.
3. Sanli O, Tefik T, Ortac M, Karadeniz M, Oktar T, Nane I, Tunc M. Laparoscopic nephrectomy in patients undergoing hemodialysis treatment. JSLS 2010;14:534-540.
4. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. Ann Surg 2004;240:205-213.
5. Clayman RV, Kavoussi LR, Soper NJ, Dierks SM, Merety KS, Darcy MD, Long SR, Roemer FD, Pingleton ED, Thomson PG. Laparoscopic nephrectomy. N Engl J Med 1991;324:1370-1371.
6. https://uroweb.org/guideline/renal-cell-carcinoma/.
7. Dell'Atti L. Feasibility and safety of laparoscopic nephrectomy in uremic patients with end-stage renal disease. Urologia 2016;83:40-42.
8. Yee J, Parasuraman R, Narins RG. Selective review of key perioperative renal-electrolyte disturbances in chronic renal failure patients. Chest 1999;115:149S-157S.
9. Gajdos C, Hawn MT, Kile D, Robinson TN, Henderson WG. Risk of major nonemergent inpatient general surgical procedures in patients on long-term dialysis. JAMA Surg 2013;148:137-143.
10. Angerri O, Lopez JM, Sanchez-Martin F, Millan-Rodriguez F, Rosales A, Villavicencio H. Simple Laparoscopic Nephrectomy in Stone Disease: Not Always Simple. J Endourol 2016;30:1095-1098.
11. Shoma AM, Eraky I, El-Kappany HA. Pretransplant native nephrectomy in patients with end-stage renal failure: assessment of the role of laparoscopy. Urology 2003;61:915-920.