Evaluation of the complications in transperitoneal laparoscopic renal and adrenal surgery with Clavien–Dindo classification

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ABSTRACT

Objective: To evaluate our complications in renal and adrenal transperitoneal laparoscopic surgeries with Clavien-Dindo classification.

Material and methods: Two hundred and eight patients to whom renal and adrenal laparoscopic surgeries were performed between January 2008 and June 2015 were included the study. One hundred and twenty one (58.2%) patients were female and 87 (41.8%) of them were male. Laparoscopic procedures were performed as radical nephrectomy (n=49; 23.6%), simple nephrectomy (n=56; 26.9%), and partial nephrectomy (n=7; 3.4%), renal cyst decortication (n=27; 13%), pyeloplasty (n=14; 6.7%) and adrenalectomy (n=55; 26.4%). Complications were classified according to Clavien-Dindo classification.

Results: The mean age of the patients was 48.01±14.9 years. The mean duration of hospital stay was 3.5±1.9 days. According to European Scoring System for Laparoscopic Operations the procedures were graded based on procedural difficulty as simple (n=27; 12.9%), difficult (n=172; 82.8%), and highly difficult (n=9; 4.3%). Complications were observed in 13 (6.3%) interventions. One of these occurred during very hard and 14 during difficult procedures. According to Clavien-Dindo Classification; Grades 1, 2, and 3 A complications developed in 3 (1.4%), 9 (4.3%), and 1(0.5%) patient, respectively.

Conclusion: Laparoscopic surgery is an efficient procedure in well-chosen patients for renal and adrenal diseases with low complication rates.

Keywords: Adrenal; complication; kidney; laparoscopy.

Introduction

Laparoscopic surgery has been introduced into urology literature during the early 1990s, and within a short period of time it demonstrated a rapid development, and took an important place in our daily urology practice.^[1] Thanks to shorter postoperative hospitalization period, lesser amount of analgesic use, early return to daily life, and more improved cosmetic outcomes, laparoscopic surgery is preferred over open surgery.^[2] Besides in parallel with increased surgical experience, and developed technology, spectrum of indications for laparoscopic surgery has enlarged, and gradually increasing number of miscellaneous cases have been treated.

In parallel with frequent use of laparoscopic surgery, recognition, and classification of its associated complications are gradually gaining importance. Nowadays, a standard accepted

classification system to be used for the reporting of complications has not been developed yet. Although a globally accepted standard classification system is not available yet, currently in the classification of complications of laparoscopic surgery Clavien-Dindo classification published in the year 1992 by Clavien et al.^[3] and updated by Dindo in the year 2004 has been used more frequently.^[4]

In this study complications of laparoscopic renal, and adrenal surgeries performed in our clinic were reviewed using Clavien-Dindo classification.

Material and methods

For this study ethics committee approval was obtained from ethics committee of our hospital. A total of 208 patients who underwent transperitoneal laparoscopic upper urinary tract surgery in our clinic between January 2008,

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and June 2015 were included in the study. Preoperatively written informed consent forms were obtained from all patients. Study population consisted of 121 (58.2%) female, and 87 (41.8%) male patients. Laparoscopic interventions performed consisted of radical nephrectomy (n=49; 23.6%), simple nephrectomy (n=56; 26.9%), partial nephrectomy (n=7; 3.4%), decortication of renal cyst (n=27; 13%), pyeloplasty (n=14; 6.7%), and adrenalectomy (n=55; 26.4%).

American Society of Anesthesiologists (ASA) scores, length of hospital stay, and body mass indices (BMIs) of the patients were recorded. Degree of difficulty of surgical interventions were evaluated based on European Scoring System for Laparoscopic Operations in Urology, and rated as simple, difficult, and highly difficult.^[5]

Complications were rated using Clavien-Dindo classification system.^[4] According to this system: Grade 1 complications are complications which do not require any medical or surgical intervention, but delay discharge of the patient, Grade 2 complications require medical treatment (blood transfusions, parenteral nutrition, antihypertensives), Grade 3 complications require, surgical, endoscopic or radiological interventions, Grade 3A complications require surgical, endoscopic or radiological interventions performed without the need for general anesthesia, Grade 3B complications encompass interventions performed under general anesthesia, Grade 4 complications consist of life-threatening complications, Grade 4A complications involve single organ dysfunction, and Grade 4B complications cause multiorgan dysfunction. Grade 5 indicates death due to the complications.^[4]

Statistical analysis

For statistical analysis Statistical Package for Social Sciences (IBM SPSS Statistics; New York, USA) program version 22.0 was used. Chi square, and means tests were used.

Results

Mean age, and BMI value of the patients were 48.01 ± 14.9 years (range, 7-81 yrs), and 25.1 ± 3.7 (16.6 - 39.1) kg/m^2 , respectively. Mean length of the hospital stay of the patients was 3.5 ± 1.9 (1-19) days. ASA scores were either ≥ 3 (n=3; 19.3%) or < 3 (n=168; 80.7%). According to European Scoring System for Laparoscopic Operations in Urology these cases were classified as simple (n=27; 12.9%), difficult (n=172; 82.8%), and highly difficult (n=9; 4.35). Nine cases classified as highly difficult were laparoscopic partial nephrectomy (n=7), and laparoscopic heminephrectomy applied for 2 cases with horseshoe kidneys. Mean operative time was calculated as 98 ± 40.9 (30-210) minutes.

Complications were observed in 13 (6.3%) interventions. These complications developed during highly difficult (n=1), and

difficult (n=12) surgical procedures. Based on Clavien-Dindo classification, Grade 1 (n=3; 1.4%), 2 (n=9; 4.3%), and 3A (n=1; 0.5%) complications were observed (Table 1). One (0.5%) patient underwent simultaneous splenectomy because of splenic rupture developed during radical nephrectomy. We switched to open surgery because of splenic rupture developed during simple (n=1), and radical nephrectomy (n=2), intractable bleeding during adrenalectomy (n=1), and technical problems during pyeloplasty (n=1). A significant difference was not detected between patients with ASA score ≥ 3 , and < 3 as for the development of complications ($p=0.413$). A statistical significance was not detected between patients with BMIs $\geq 30 \text{ kg/m}^2$, and $< 30 \text{ kg/m}^2$ as for development of complications ($p=0.148$).

Discussion

Nowadays, laparoscopic surgery which takes an important place in urology practice keeps on developing with the enhancing support provided by surgical experience, and technology. During first years of its application laparoscopic technique was mostly used for diagnostic purposes, and ablative procedures, however currently laparoscopic technique is being used successfully for oncological, and complex reconstructive procedures.^[6-8] Because of more frequent use of laparoscopic surgery, we inevitably encounter complications related to this surgical technique more often. When literature data were reviewed, rates of complications related to laparoscopic interventions demonstrate a large distribution range. Fahlenkamp et al.^[9] performed a study on 2407 patients, and reported complication rates as 4.4 percent. However Gomella et al.^[10] indicated complication rate of 7.98 percent. Xu et al.^[11] compared patients who had undergone laparoscopic radical nephrectomy (n=88), and open nephrectomy (n=526) regarding complication rates, and reported complication rates as 19.31% in the laparoscopic radical nephrectomy, and 30.04% in the open radical nephrectomy arms. Consequently, they demonstrated development of lower rates of complications in the laparoscopic surgery relative to open surgery arm.^[11] In laparoscopic series bleeding is the most frequently detected complication. In the study performed by Colombo et al.^[12] on 1867 patients who had undergone laparoscopic surgery, bleeding complication was detected in 5% of the cases. In our series bleeding requiring blood transfusion was detected in 3.3% of the cases which appears to be similar to those reported in the literature. In our series we had to switch to open surgery in 3 of 7 patients because of intractable bleeding. The remaining 4 cases with bleeding could be controlled with conservative approaches.

Basic factors which determine complication rates appear to be related to surgical experience, and difficulty level of the procedures. Although many studies have demonstrated decrease in the incidence of complications in line with increase in surgical

Table 1. Complications based on Clavien-Dindo classification

Grades	Number of patients	Complications
Grade 1	1	Prolonged, and abundant drainage through the drain
	2	Delayed postoperative normalization of bowel movements
Grade 2	1	Leucocytosis, and high fever requiring antibiotherapy and lasting more than 3 days
	1	Wound site infection requiring antibiotherapy
	7	Blood loss requiring postoperative blood transfusion
Grade 3a	1	Development of abscess in the surgical loge requiring percutaneous drainage

experience^[13,14] scarce number of studies could not demonstrate any change in complication rates with surgical experience.^[15,16] European Scoring System for Laparoscopic Operations in Urology classifies laparoscopic procedures as simple, difficult, and highly difficult.^[5] Based on this grading system, many studies have demonstrated that the incidence of complications increases in parallel with the difficulty level of the laparoscopic procedure.^[5,16,17] Binbay et al.^[16] 313 reviewed urological laparoscopic interventions and classified them based on their difficulty levels as simple (n=5; 6.8%), difficult (n=18; 10.8%), highly difficult (n=16; 22.2%). In our study complication rate in the difficult surgery group was found to be higher when compared with the simple surgery group. However number of patients in the highly difficult group was lower in comparison with other groups. Any increase in complication rates in highly difficult surgery group was not observed when compared with other groups.

In laparoscopic surgery, factors presumably effective on complication rates are also taken into consideration which constitute BMI of the patient, and ASA score which rates the patient's preoperative risk of anesthesia. Previous studies have shown that laparoscopic surgery is difficult to perform in obese individuals, however any correlation between obesity, and incidence of complications could not be demonstrated.^[10,16,18] Gong et al.^[19] reviewed 239 cases of laparoscopic renal surgery, and categorized the patients into 5 groups based on BMIs, and couldn't find any intergroup difference as for complication rates. Also in our study any correlation could not be found between BMI value, and development of complications. ASA scoring system evaluates preoperative risk of anesthesia.^[20] Literature data demonstrates the presence of a significant correlation between ASA score, and development of complication after laparoscopic surgery.^[10,16] Permpongkosol et al.^[21] evaluated 2775 surgical cases of laparoscopic urology, and reported a correlation

between development of complication, and increase in ASA score. However in our study any correlation was not detected between higher ASA score, and complication rate after laparoscopic surgery.

Although many classification systems have been used in the description, and classification of complications of laparoscopic surgery, a generally accepted standardized classification system is not available. However in recent years Clavien-Dindo classification has been increasingly used in the classification of complications related to laparoscopic surgery.^[21,22] Permpongkosol et al.^[21] reported development of complications in 22.1% (n=614) of 2775 procedures of laparoscopic surgery. Based on Clavien classification their complications were of Grades 1 (7.53%), 2 (6.85%), 3A (0.83%), 3B (1.59%), 4A (0.6%), and 4B (0.04%) in respective percentages of patients. Among all patients mortality rate (ie. Grade 5 complications) was reported as 0.07 percent. The authors concluded that Clavien system is helpful in the classification of complications, however they also indicated that development of a certain standard classification system for urology will be more useful as for reporting, and comparison of complications with those of the other series. In their review article Yoon et al.^[22] analyzed 907 studies published in 5 eminent journals, and reported use of Clavien-Dindo classification in 256 (33.3%) studies, and arrived at a conclusion that Clavien-Dindo classification has been used at an increasingly higher rate within years, and accepted by urologists. However in their articles the authors emphasized the presence of a gap for gradually increasing number of applications, despite more frequent use of standardized reporting systems indicated in articles on surgical complications.^[22] We also used Clavien-Dindo classification in the classification of complications in order to standardize our study. According to this classification we determined our surgery complication rate as 6.3 percent (Grade 1=1.4%, Grade 2=4.3%. and Grade 3A=0.5%). However in our series splenic rupture was seen in 3 (1.4%) patients. Two of them were taken under control with conservative methods, while in the third case the bleeding could not be halted with conservative methods which necessitated splenectomy. However since postoperative maintenance, and discharge of the splenectomized patient, and another patient with splenic rupture were not delayed, these adverse events were not evaluated as a complication based on Clavien-Dindo classification.

In conclusion, complications of laparoscopic surgery are dependent on the degree of difficulty of surgery, and the experience of the surgeon. Complication rates gradually decrease dependent on the experience of the surgeon. Many of these complications emerge during postoperative period, and for reporting of these complications Clavien-Dindo classification is likely to be a standard classification system. However development of a classification system encompassing intraoperative complications

specific to urologic laparoscopic surgery will standardize classification of these complications, and enable publication of higher quality comparative studies on the more successful management of complications.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Ankara Numune Training and Research Hospital.

Informed Consent: Written informed consent was obtained from all the patients.

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