НИРКИ KIDNEYS

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Nephrectomy indications in kidney diseases: 10-years' experience study

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Abstract. ***Background.*** *Nephrectomy, a performance surgery in urology practice, may lead to an irreversibly kidney injuries during surgical removal. This study aims to describe 10-years of experience with nephrectomy, its indications and complications in kidney diseases.* ***Materials and methods.*** *Data for all the patients who underwent nephrectomy were collected including demographics, age, sex, education, smoking, alcohol consumption, aetiology, past medical and surgical history and comorbidity. Indications for nephrectomy were stones, obstruction, tumors, pyelonephritis and autosomal dominant polycystic kidney disease. Among complications, thrombocytopenia, fever, hyperkalemia, hypertension, ileus, pneumonia, pneumothorax, septic shock, surgical site infection, hyperglycemia, bleeding and postoperative nausea and vomiting were recorded. Preoperative preparation included laboratory tests such as complete blood count, renal function test and liver function test. It is reasonable to perform renoscintography before nephrectomy to consider partial nephrectomy. However, in our study we performed it routinely because nearly all patients underwent ultrasonography or/and computed tomography scan of abdomen/pelvis to detect pathologies. A percutaneous polyurethane catheters or stents were placed. A guidewire was inserted into the kidney via the rigid cystoscope.* ***Results.*** *A total of 50 nephrectomies were performed. The median age of patients was 45 years ranging from 14 to 73 years. About 60 % of the patients were females and 40 % were males. Patients were educated (48 %), smoking (56 %), alcoholic (12 %), with past medical and surgical history (50 %), comorbidities (46 %) and lived in rural region (44 %) and urban areas (56 %). Stones and obstruction accounted for the majority of cases, 52 and 36 %, respectively. Most of the nephrectomies were performed with laparoscopic approach (58 %). Open surgery was done in 15 cases (30 %) because of adhesions and emphysema. Complications related to laparoscopy and open surgery occurred in 17 (34 %) of patients. Thrombocytopenia, fever, hyperkalemia, hypertension, ileus, pneumonia, pneumothorax, septic shock, surgical site infection, hyperglycemia, bleeding and postoperative nausea and vomiting were recorded.* ***Conclusions.*** *Stone disease and obstruction were the most common benign conditions requiring nephrectomy. The laparoscopic approach can be feasible for most benign kidney diseases requiring nephrectomies with adequate expertise. Complication rate in it is comparable with that of open surgery.*

Keywords: *nephrectomy; kidney diseases; nephrolithiasis; stone; laparoscopy*

Introduction

Commonly, nephrectomy is a performance surgery in urology practices may lead to an irreversibly kidney injuries during surgical removal. Recently, the laparoscopic approach is rising the usage for managing the damaging of renal tissues as a result of the resources availability as well as exposure of more urologists to minimally invasive techniques [1].

Simple nephrectomy is a traditional name used for nephrectomies of the benign conditions; however, these are associated with complications because the frequent presence of dense peri-nephric adhesions [1–5]. Zelhof et al. have suggested that the term "simple" should be changed to "benign" based on observation of raised complications for benign conditions when compared with radical nephrectomy database [1].

The rate of nephrectomy for simple indications has been declining in developed countries because of early detection and treatment, however, a large proportion of cases still land up with nephrectomy in our locality. There is a requirement to determine the contributors to the losing kidneys and take appropriate options to institute early management in high-

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risk cases. In developing countries, there is a much higher nephrectomy rate done for benign conditions compared to developed countries [6, 7].

The purpose of this study was to describe the 10-years of experience with nephrectomy, its indications and complications in kidney diseases.

Materials and methods

Ethical consideration

An ethical clearance had been obtained from the ethical committee of the Department of Urology and Renal Transplantation Center (No. 1505 in May 2013) and an informed consent has been signed after explaining the objectives of the study.

Study design and setting

A retrospective study carried out in the Department of Urology and Renal Transplantation Center from June 2013 to May 2023.

Inclusion criteria:

1. Malignant: renal cell carcinomas (RCC), urothelial carcinomas and nephroblastomas.

2. Benign: benign tumors, infectious-related and non-infectious-related.

Exclusion criteria:

1. Pregnancy.
2. Contraindications to the anaesthesia.
3. Hemodynamic instability.
4. Loss of follow up.

Data collection

Data for all the patients who underwent nephrectomy were collected including demographics, age, sex, education, smoking, alcohol, residency, aetiology, past medical and surgical history and comorbidity. Indications for nephrectomy were stones, obstruction, tumors, pyelonephritis and autosomal dominant polycystic kidney disease and complications were thrombocytopenia, fever, hyperkalemia, hypertension, ileus, pneumonia, pneumothorax, septic shock, surgical site infection (SSI), hyperglycemia, bleeding and postoperative nausea and vomiting (PONV).

Preparation

Preoperative preparation including laboratory tests (complete blood count, renal function test, liver function test). It is reasonable to perform renoscintography before nephrectomy to evidence partial nephrectomy. However, in our study we performed routinely because nearly all cases underwent ultrasonography or/and computed tomography scan of abdomen/pelvis to detection of pathologies.

Procedure

A total of 50 nephrectomies were performed. A percutaneous polyurethane placed or stents were inserted. A guidewire was inserted into the kidney via the rigid cystoscope. Procedure done according to [8–10].

Statistical analysis

Statistical Package for the Social Sciences software ver. 25 (IBM, Chicago, USA) was used to analysed results. The mean ± standard deviation, frequency and percentage were expressed the descriptive data. Chi-square test was used to determine the difference. P value of less 0.05 is considered significant.

Results

The basic demographic data of the patients are shown in Table 1. The median age was 45 years ranged from 14 to 73 years. About 60 % of the patients were females and 40 % were males. Patients were well educated (48 %), smoking (56 %), alcoholic (12 %), with past medical and surgical history (50 %) and comorbidities (46 %).

Stone and obstruction accounted for the majority of cases, 52 and 36 %, respectively. The indications for nephrectomy listed in Table 2.

Most of the nephrectomies were performed with laparoscopic approach 29 (58 %), which was significantly better to performed than open surgery which was done in 15 cases (30 %) because of adhesions and emphysema, showed in Table 3.

Complications related to laparoscopy and open surgery occurred in 17 (34 %) of patients. Thrombocytopenia, fever, hyperkalemia, hypertension, ileus, pneumonia, pneumothorax, septic shock, SSI, hyperglycemia, bleeding and PONV were recorded in Table 4. In this study, there was no case of death reported postoperatively.

Discussion

In 1869 Gustav Simon performed the first planned nephrectomy for the treatment of uretero-vaginal fistula [11]. There is a gradual decline in the number of nephrectomies in developed countries because of early diagnosis and introduction of modern antibiotics and minimally invasive techniques [12].

Table 1. Patient characteristics

Variables		n	%
Age, mean ± SD (median), years		47.5 ± 8.7 (45)	
Sex	Male	20	40
	Female	30	60
Education (primary, secondary and high)		24	48
Smoking (yes)		28	56
Alcohol (yes)		6	12
Past medical and surgical history (positive)		25	50
Comorbidities (yes)		23	46

Table 2. Indications for nephrectomy

Indication	n	%	P
Stones	26	52	0.066
Obstruction	18	36	
RCC	6	12	
Pyelonephritis	17	34	
Autosomal dominant polycystic kidney disease	5	10	
Pheochromocytoma	3	6	

In this study, the median age was 45 years. About 60 % of the patients were females and 40 % were males. Patients were well educated (48 %), smoking (56 %), alcoholic (12 %), with past medical and surgical history (50 %) and comorbidities (46 %). These findings are dissimilar to study of Ezomike et al. [6] in Malawi and Khan et al. [13] in Pakistan.

In present study stone and obstruction accounted for the majority of cases. Stone disease was the major contributor to loss of renal units stressing the require for early diagnosis and management of renal stones. In a study by Ezomike et al., the majority of nephrectomies were done for benign conditions [6]. Similarly, another study from Pakistan also had most nephrectomies performed for benign diseases, mostly kidney stones [13].

Most of the nephrectomies in this work were performed with laparoscopic approach (58 %), which was significantly better to performed than open surgery which was done in 15 cases (30 %). The first laparoscopic nephrectomy was performed by Clayman in 1990 for oncocytoma of the kidney [14].

Complications related to laparoscopy and open surgery occurred in 17 (34 %) of patients like thrombocytopenia, fever, hyperkalemia, hypertension, ileus, pneumonia, pneumothorax, septic shock, SSI, hyperglycemia, bleeding and PONV were reported. The advantages of laparoscopy in reducing the postoperative pain, a shorter hospital stay, earlier return to normal activities, and improved cosmetic compared with the open approach are well documented [15–21].

Routinely, with improvement in the instrumentation and the dissemination of skills, laparoscopic renal surgery is now practiced in many centers around the world.

Overall, we suggest that the laparoscopic approach is feasible in most cases requiring nephrectomy for kidney diseases.

Table 3. Nephrectomy approaches

Approach	n	%	P
Laparoscopic	29	58	0.014
Open	15	30	
Laparoscopic + open	6	12	

Table 4. Complications of nephrectomy

Complication	n	%
Thrombocytopenia	1	2
Fever	4	8
Hyperkalemia	1	2
Hypertension	2	4
Ileus	1	2
Pneumonia	4	8
Pneumothorax	1	2
Septic shock	2	4
SSI	2	4
Hyperglycemia	1	2
Bleeding	1	2
PONV	3	6

Conclusions

Stone disease and obstruction were the most common benign conditions requiring nephrectomy. The laparoscopic approach can be feasible for most benign kidney diseases requiring nephrectomies with adequate expertise with comparable complication rates with open surgery.

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Показання до нефректомії при захворюваннях нирок: аналіз 10-річного досвіду

Резюме. Актуальність. Нефректомія — операція, що виконується в урологічній практиці, — може призвести до необоротного пошкодження нирки під час хірургічного видалення. **Мета дослідження:** описати 10-річний досвід нефректомії, показання до неї та ускладнення при захворюваннях нирок. **Матеріали та методи.** Були зібрані дані всіх пацієнтів, які перенесли нефректомію, включаючи демографічні дані, вік, стать, освіту, куріння, споживання алкоголю, етіологію, медичний і хірургічний анамнез та супутню патологію. Показаннями до нефректомії були камені, обструкція, пухлини, пієлонефрит і автосомно-домінантний полікістоз нирок. Серед ускладнень зареєстровані тромбоцитопенія, лихоманка, гіперкаліємія, гіпертензія, кишкова непрохідність, пневмонія, пневмоторакс, септичний шок, інфекція в місці хірургічного втручання, гіперглікемія, кровотеча та післяопераційна нудота й блювання. Передопераційна підготовка включала лабораторні тести, такі як загальний аналіз крові, печінкові та ниркові проби. Доцільно виконати реносцинтиграфію перед нефректомією, щоб розглянути можливість часткового видалення органу. Однак у нашому дослідженні ми проводили її планово, оскільки майже всі пацієнти проходили ультразвукове дослідження або/та комп'ютерну томографію черевної порожнини/таза для виявлення патологій. Черезшкірно вводили поліуретанові катетери або встановлювали стенти. Провідник введено в нирку через жорсткий цистоскоп. **Результати.** Загалом було виконано 50 нефректомій. Середній вік пацієнтів становив 45 років, коливаючись від 14 до 73 років. Жінок було приблизно 60 %, чоловіків — 40 %. Пацієнти були освіченими (48 %), курили (56 %), споживали алкоголь (12 %), мали обтяжений медичний та хірургічний анамнез (50 %), супутні захворювання (46 %), проживали як у сільській місцевості (44 %), так і у міських районах (56 %). У більшості випадків (52 і 36 %) виявлено відповідно камені або обструкцію. Більшість нефректомій виконано за допомогою лапароскопічного методу (58 %). Відкрите оперативне втручання з приводу спайкового процесу та емфіземи мало місце в 15 випадках (30 %). Ускладнення, пов'язані з лапароскопією та відкритою операцією, виникли в 17 (34 %) пацієнтів. Були зареєстровані тромбоцитопенія, гарячка, гіперкаліємія, гіпертензія, кишкова непрохідність, пневмонія, пневмоторакс, септичний шок, інфекція в місці хірургічного втручання, гіперглікемія, кровотеча та післяопераційна нудота й блювання. **Висновки.** Кам'яна хвороба та непрохідність були найпоширенішими доброякісними станами, що вимагали нефректомії. За належного досвіду лапароскопічний підхід можна застосовувати при більшості доброякісних захворювань нирок, що потребують нефректомії. Рівень ускладнень при цьому буде порівнянним із таким за відкритої хірургії.

Ключові слова: нефректомія; хвороби нирок; нефролітіаз; камінь; лапароскопія