

# Indications and Outcome of Nephrectomy for Benign Kidney Disease: Experience from a Tertiary Level Hospital of Nepal

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## Abstract

Nephrectomy is commonly performed in urology practice for a number of benign conditions such as stone disease, pelviureteric junction obstruction and pyelonephritis. This study aims to describe our experience with surgical treatment of benign renal diseases over the last two years. It highlights different indications, associated co-morbid factors and complications associated with nephrectomy for benign kidney diseases. Methods This is a retrospective study of nephrectomy for benign kidney diseases over 2 years in a tertiary centre of Nepal identifying diagnosis, surgical approach, perioperative management and postoperative course. Results A total of 53 nephrectomies were performed for benign indications. Stone disease and congenital PUJ obstruction were the most common indications. Laparoscopic approach was most commonly employed. Complication rates were acceptable with both open and laparoscopic approaches. Conclusion Most benign nephrectomies in our setup were for stone diseases and PUJ obstruction. The surgical outcomes were similar with both open and laparoscopic approaches.

**Keywords:** Nephrectomy; Benign kidney diseases; Nephrolithiasis

## Introduction

Nephrectomy is a commonly performed surgery in urology practice and a number of benign conditions such as stone disease, pelviureteric junction obstruction and pyelonephritis may lead to an irreversibly damaged kidney warranting surgical removal. In recent years, the laparoscopic approach is increasingly being used for managing such conditions as a result of the availability of more resources as well as exposure of more surgeons to minimally invasive techniques.

The term 'simple' nephrectomy has traditionally been used for nephrectomies performed in benign conditions, however, several studies have pointed out that these surgeries are associated with more complications than those for malignancies due to the frequent presence of dense perinephric adhesions in

such cases. Zelhof et al. have suggested that the term 'simple nephrectomy' should be changed to 'benign nephrectomy' based on observation of increased complications of nephrectomy for benign causes when compared with radical nephrectomy data [1].

The number of nephrectomies for benign indications has been decreasing in developed countries because of early diagnosis and management of such conditions, however, a large proportion of patients still land up with nephrectomy in our scenario. So, there is a need to identify major contributors to the loss of kidneys in such patients and take appropriate steps to institute early treatment in high-risk groups. In addition, there is geographical variation in the indications for nephrectomy as certain urological diseases are more prevalent in some countries. In developing countries, there is a much higher rate of nephrectomy performed for benign conditions of the kidney compared to western countries [2,3].

Though commonly practiced in our country, there is a paucity of studies documenting the indications, surgical approach and complications relating to nephrectomy for such benign conditions. This present study aims to describe our experience with surgical treatment of benign renal diseases over the last two years. It highlights different indications, associated co-morbid factors and complications associated with nephrectomy for benign kidney diseases.

## Research Design and Methodology

This retrospective observational study was carried out in the Department of Urology and Kidney Transplant Surgery, Tribhuvan University Teaching Hospital of Nepal from August 2019 to July 2021. Data for all the patients who underwent nephrectomy for benign renal diseases within this period were collected including the patient demographics, etiology, co-morbid conditions and outcome after the procedure. Pre-operative investigations including both imaging (ultrasonography and CT scan of abdomen/pelvis, DTPA renograms) and laboratory parameters (complete blood counts, renal function tests) were recorded. Operative notes were

reviewed for details of the procedure and intraoperative complications.

SPSS statistical software version 25 was used for statistical analysis. Student t-test and Chi-square test were used for continuous and categorical variables respectively. A p-value of less than 0.05 was considered significant.

## Results

A total of 53 nephrectomies were performed for diseased kidneys with benign pathology. The basic demographic data of the patients are shown in (Table 1). The mean age of the patients was 46 years, ranging from 12 to 80 years. 60% of the patients were females. Stone disease and congenital PUJ obstruction accounted for the majority of cases (32 and 11 percent respectively). The indications for nephrectomy in remainder of cases included infective conditions of the kidney (xanthogranulomatous pyelonephritis, emphysematous pyelonephritis and chronic pyelonephritis resulting from recurrent UTIs), ureteric strictures and ADPKD. The majority of patients had preoperative GFR values of between 30 and 60 as measured by DTPA renogram. Comorbidities were present in 16 patients (30%), of which 4 patients had multiple comorbidities.

**Table 1:** Patient characteristics.

Characteristics	Number (Percentage)
Mean (range) age, years	46 (12-80)
Sex	
Male	21(39.6)
Female	32 (60.4)
Etiology	
Renal stones	22 (41.5)
Ureteric stones	10 (18.9)
PUJ obstruction	11 (20.8)
Ureteric stricture	3 (5.7)
Xanthogranulomatous pyelonephritis (XGP)	3 (5.7)
Emphysematous pyelonephritis (EPN)	2 (3.8)
Chronic pyelonephritis (Recurrent UTI)	1 (1.9)
ADPKD	1 (1.9)
Pre-operative GFR mL/min/1.73m <sup>2</sup>	
<30	4 (7.5)
30-60	26 (49.1)
>60	21 (39.6)
Not measured	2 (3.8)
Comorbidities	16 (30)
Hypertension	11 (20.8)
Diabetes mellitus	4 (7.5)

Chronic Kidney Disease (CKD)	2 (3.8)
Coronary Artery Disease (CAD)	1 (1.9)
Rheumatic Heart Disease (RHD)	1(1.9)
Hypothyroidism	1 (1.9)

Most of the nephrectomies were performed with transperitoneal laparoscopic approach (56.6%). Out of 34 cases attempted with laparoscopic approach, conversion to open surgery was required in 4 cases (11.76%) because of dense adhesions in 3 cases and occurrence of subcutaneous emphysema during port creation in 1 case. The duration of surgery was significantly longer in laparoscopic compared with open surgery (Table 2).

**Table 2:** Operative procedural details.

Surgical approach		p-value
Laparoscopic	30 (56.6)	<0.05
Open	19 (35.8)	
Laparoscopic converted to open	4 (7.5)	
<b>Duration of surgery(hours)</b>		
Laparoscopic	3.0	
Open	1.9	
Laparoscopic converted to open	2.9	

Complications related to surgery occurred in 15(28.3%) of patients, the majority of which were Clavien Dindo grade I and II. Pneumothorax occurred in one case of laparoscopic nephrectomy postoperatively which was managed with chest tube insertion. One patient with emphysematous pyelonephritis developed septic shock requiring vasopressor support in the open group. Another patient approached with laparoscopy who had dense adhesion requiring open conversion developed hypovolemic shock in the immediate postoperative period and upon exploration was found to have slippage of renal artery ligature which was immediately controlled. The patient had a protracted hospital stay requiring prolonged mechanical ventilator support and vasopressor support. He also developed pneumonia and surgical site infection and was discharged on the 24th postoperative day. There was no case of mortality in our series (Tables 3-5).

**Table 3:** Surgical complications.

Complications	Number of patients
<b>Laparoscopic approach</b>	
Thrombocytopenia	1
SSI(deep)	1
Fever	2
PONV	1
Hyperkalemia	1

Hypertension	1
Ileus	1
Pneumonia	2
Pneumothorax	1
<b>Open approach</b>	
Hyperglycemia	1
Hypotension	1
Fever	1
Pneumonia	1
Septic shock	1
SSI	1
<b>Laparoscopic converted to open</b>	
Bleeding from renal artery stump	1
Hypovolemic shock	1
PONV	2
SSI(superficial)	1
Pneumonia	1

**Table 4:** Clavien Dindo grading of complications.

	<b>Average patients</b>
Grade 1	4 (7.5)
Grade 2	7 (13.2)
Grade 3	2 (3.8)
Grade 4	2 (3.8)
<b>Total number of patients with complications</b>	15 (28.3)

**Table 5:** Clavien Dindo grading stratified by surgical approach.

	<b>Lap</b>	<b>Open</b>	<b>Lap converted to open</b>
<b>Grade 1</b>	3	1	1
<b>Grade 2</b>	5	2	0
<b>Grade 3</b>	1	0	0
<b>Grade 4</b>	0	1	1

The average hospital stay was slightly shorter in the laparoscopic approach compared with open surgery. The longest hospital stays were in cases requiring conversion to open (**Table 6**).

**Table 6:** Hospital stays (post-operative).

<b>Surgical approach</b>	<b>Hospital stay(days)</b>	<b>p-value</b>
Laparoscopic	3.47	0.02
Open	4.21	
Laparoscopic converted to open	9.50	

## Discussion

In 1869 Gustav Simon performed the first planned nephrectomy for the treatment of uretero-vaginal fistula [4]. There is a gradual decline in the number of nephrectomies for benign conditions in developed countries because of early diagnosis and introduction of modern antibiotics and minimally invasive techniques [5,6]. However, benign diseases still account for a majority of nephrectomies in developing countries. In a study by Dutta et. al., 62.5% of nephrectomies were done for benign conditions [2]. Similarly, another study from Pakistan also had most nephrectomies performed for benign diseases, mostly kidney stones [3]. In the present study also, stone disease was the major contributor to loss of renal units stressing the need for earlier diagnosis and management of renal stones as well as stringent follow-up after surgical management to optimize renal function. Congenital PUJ obstruction was the second most common cause for renal damage which is also preventable with diagnosis at an earlier age and close follow-up and intervention at the earliest indication. Infectious renal conditions accounted for relatively fewer cases of nephrectomies in this study.

The first laparoscopic nephrectomy was performed by Calyman in 1990 for oncocytoma of the kidney [7]. After this initial description, laparoscopy has emerged as the standard of care for benign renal disease requiring surgical intervention.

The advantages of reduced postoperative pain, a shorter hospital stay, earlier return to normal activities, and improved cosmesis compared with the open approach are well-documented [8,9]. With improvement in instrumentation and dissemination of skills, laparoscopic renal surgery is now routinely practiced in many centers around the world. In our series too, most cases were managed with laparoscopic approach and open conversion was required in only a few cases.

The complication rate was acceptable with a slightly higher incidence of minor complications (Clavien-Dindo grade I-III) compared with open group. Hospital stay was also noted to be slightly shorter in patients operated laparoscopically. Overall this study suggests that the laparoscopic approach is feasible in most cases requiring nephrectomy for benign kidney diseases in our setup with open surgery reserved for cases with dense perinephric adhesions such as xanthogranulomatous pyelonephritis.

## Conclusion

Stone disease and congenital PUJ obstruction were the most common benign conditions requiring nephrectomy in our setup indicating that there is a need for earlier diagnosis and management of these cases. 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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