

## Outcome and Complication of Open vs Laparoscopic Nephrectomy at Balochistan

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### Abstract

**Introduction:** Nephrectomy is recommended for individuals with a kidney that has sustained irreversible damage. This surgical procedure can be conducted using either an open approach or a laparoscopic technique. While existing data suggest that laparoscopy is the more favorable option, further evidence is necessary to support this claim. The aim of the current study was to evaluate and compare the results of nephrectomy performed via open and laparoscopic methods.

**Methods:** Between December 2023 and March 2024, 40 patients had laparoscopic nephrectomy and 40 patients had open nephrectomy. The mean patient age was 46.85 years in the group receiving open surgery and 48.15 years in the group receiving laparoscopy, with no significant group difference. Variables included operative time, length of hospitalization, and postoperative duration of nil per os (NPO) state. Complications such as hemorrhage, organ damage, infection, and reoperation were obtained from data in the patient medical records. The groups were compared using a t test and chi square.

**Results:** The average operative time for open surgery was recorded at 180.45 minutes, while the average for laparoscopic surgery was 190.60 minutes. Statistical analysis revealed no significant difference in the mean operative times between the two groups ( $P = .590$ ). However, the mean length of hospitalization was notably longer for patients undergoing open surgery, averaging 5.6 days compared to 4.69 days for those who had laparoscopic procedures ( $P = .008$ ). Additionally, there were no significant differences in the mean duration of the NPO state postoperatively between the two groups, with times of 29.8 hours for open surgery and 29.60 hours for laparoscopic surgery ( $P = .593$ ). Operative complications were observed in 12 patients from the open surgery group and 10 patients from the laparoscopic group, with no significant difference in complication rates between the groups ( $P = .593$ ).

**Conclusions:** The results of the two procedures were comparable. Laparoscopic nephrectomy, being a minimally invasive technique, is considered a viable alternative to open surgery.

**Keywords:** Nephrectomy; Laparoscopic nephrectomy; Open nephrectomy; Radical nephrectomy

### INTRODUCTION

Nephrectomy is recommended for individuals with a kidney that has sustained irreversible damage as a result of symptomatic chronic infections, kidney stones, or significant traumatic injuries. This surgical procedure is also utilized to address both

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malignant and benign tumors of the kidney, renovascular hypertension stemming from unmanageable renal artery conditions, or extensive unilateral parenchymal damage caused by nephrosclerosis, pyelonephritis, reflux, or congenital dysplasia.

The procedure may be conducted using either an open surgical approach or a laparoscopic technique [1]. In the 20th century, the majority of nephrectomies conducted for both benign and malignant renal conditions were carried out using an open surgical technique [2]. Since Clayman conducted the first total laparoscopic nephrectomy in 1990, there has been significant interest in the field of urologic laparoscopy [3].

Laparoscopic nephrectomy can be conducted via either a transperitoneal or retroperitoneal approach. Surgeons often observe that this minimally invasive technique results in a reduced duration of hospital stay, quicker resumption of oral intake, decreased need for pain relief medication, and a swifter return to regular activities when compared to traditional open surgery. The complication rates and cancer control outcomes for both methods are comparable. While various studies indicate that laparoscopic procedures typically require a longer operative time, increased surgeon proficiency may lead to operative durations that are shorter than those associated with open surgery [4].

The aim of the current research was to assess the outcomes associated with nephrectomy using both open and laparoscopic approaches. Although the findings are not unprecedented, it is essential to share such results from various parts of the world, showcasing different levels of surgical experience, to gain a comprehensive understanding of the viability of innovative methods in diverse clinical settings.

METHODS

Between December 2023 and March 2024, 40 patients had laparoscopic nephrectomy and 40 patients had open nephrectomy. Patients were allocated into two groups without randomization of their order. In total, twenty patients received laparoscopic nephrectomy through a transperitoneal approach, while another twenty underwent open nephrectomy. The average age of patients in the open surgery group was 46.85 years (with ages ranging from 19 to 73 years), while the laparoscopic group had a mean age of 48.15 years (ranging from 22 to 75 years), with no significant differences observed between the groups. Additional patient characteristics, including gender, nephrectomy side, history of previous abdominal surgeries, and the rationale for nephrectomy, are included in the provided documentation.

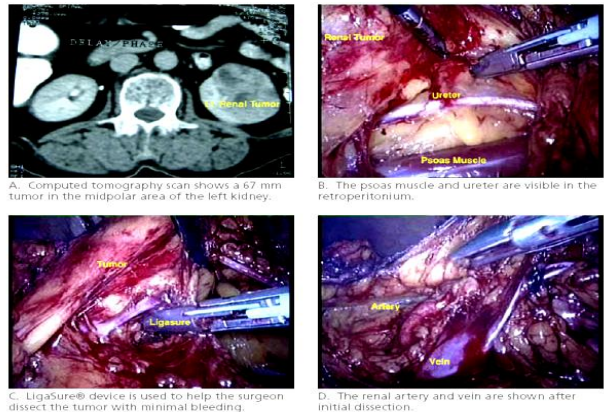
Table 1. Characteristics of the patients Receiving Open Nephrectomy or Laparoscopic Nephrectomy

Characteristic	Open Nephrectomy		Laparoscopic Nephrectomy	
	N	% n	N	% n
Male	12	30%	18	45%
Female	28	70%	22	55%
Right Kidney	22	55%	28	70%
Left Kidney	18	45%	12	30%
Previous abdominal Surgery	18	45%	16	40%
Nephrectomy indications				
Nonfunctioning kidney	24	60%	22	55%
XGP	6	15%	6	15%
Multicystic kidney	0	0%	2	5%
Renal Tumor	8	20%	10	25%
Renal Abscess	2	5%	0	0%

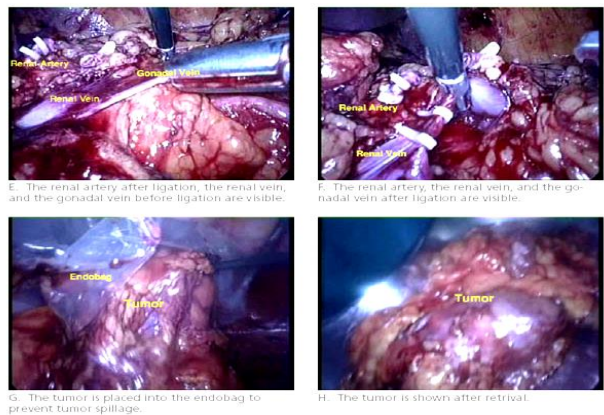
The leading cause for nephrectomy in both patient cohorts was identified as a nonfunctioning kidney. Each operation was carried out under general anesthesia. For those undergoing laparoscopic procedures, a nasogastric tube and urethral catheter were positioned before the surgery commenced. The procedure was executed in a flank position with the aid of an Olympus laparoscope. (Olympus Europa GmbH, Hamburg, Germany).

The procedure commenced with the umbilicus as the principal access site, utilizing a direct trocar insertion method. A pneumoperitoneum was created using carbon dioxide, which enabled the laparoscopic lens to inspect the abdominal cavity. Following the medialization of the colon, access to the retroperitoneum was successfully achieved. Throughout the laparoscopic procedure, the surgeons made use of an array of instruments. LigaSure® device (Valleylab, Boulder, CO, USA). This technique proved to be especially beneficial in challenging situations for both dissection and the management of bleeding. The steps in the procedure are provided in **figure 1** and **figure 2**.

**Figure 1, part 1. Procedure for Laparoscopic left Radical Nephrectomy. (UroToday int J. 2010 Feb;3(1))**



**Figure 2 part 2. Procedure for Laparoscopic Left Radical Nephrectomy(UroToday int J. 2010 Feb;3(1))**



In the cohort that underwent open surgery, 8 patients had radical nephrectomy, while 32 patients received simple nephrectomy. Conversely, in the laparoscopic surgery group, 2 patients underwent partial nephrectomy, 8 patients had radical nephrectomy, and 30 patients were treated with simple nephrectomy.

The analysis of group differences was conducted using SPSS, Inc (Chicago, IL). Descriptive statistics, which encompassed mean, standard deviation (SD), and range, were calculated. Continuous variables were assessed using a t-test, whereas categorical variables were analyzed with a chi-square test.

A significance level of  $P < .05$  was established to identify significant differences. The variables of interest included operative time, length of hospitalization, and the postoperative duration of nil per os (NPO) status. Data regarding complications, including hemorrhage, organ damage, infection, and reoperation, were sourced from the patients' medical records.

## RESULTS

The findings from the data analyses are presented in the average operative time for open surgery was recorded at 180.45 minutes, while the average for laparoscopy was 188.8 minutes. The difference in mean operative time between the two groups was not statistically significant ( $P = .571$ ). However, the mean length of hospitalization was notably longer for patients undergoing open surgery, averaging 4.9 days compared to 3.45 days for those who had laparoscopic procedures ( $P = .008$ ). Additionally, there were no significant differences in the mean duration of the NPO state postoperatively between the two surgical approaches, with averages of 24.6 hours for open surgery and 28.25 hours for laparoscopy ( $P = .653$ ).

Operative complications and their treatments are listed in. There was no mortality in either group of patients. There was no significant group difference in complication rates ( $P = .497$ ).

A total of 12 patients (30%) who underwent open surgery experienced operative complications. These complications included bleeding that necessitated blood transfusions ( $n = 4$ ), wound infections that developed two weeks after the procedure, requiring rehospitalization and antibiotic therapy ( $n = 4$ ), and peritonitis that required reoperation the day after nephrectomy ( $n = 4$ ). Organ damage was noted in 12 patients, with 2 of these individuals suffering from pyelonephritis that necessitated adrenalectomy. Additionally, 2 patients incurred injuries to the spleen's capsule due to severe adhesions, while 4 patients experienced injuries to the inferior vena cava (IVC), both of which were promptly repaired.

In the course of laparoscopic surgery, operative complications were reported in 10 patients, accounting for 25% of the total. These complications included instances of bleeding in 6 patients and organ damage in 4 patients. The organ damage cases featured an arterial injury that was swiftly ligated and a pancreatic injury. Moreover, 4 patients required a transition to open nephrectomy, with 2 cases resulting from uncontrolled bleeding and 1 case due to severe perirenal adhesions.

## DISCUSSION

In this study, there was no significant difference in the average operative time between the groups, with open surgery taking an average of 176.25 minutes and laparoscopy taking 188.8 minutes. According to Devoe et al. [5], laparoscopic nephrectomy had a

shorter mean operative time than open nephrectomy, with times of 161 minutes and 191 minutes, respectively. Notably, the first patients who underwent laparoscopic surgery had longer operation times compared to those who were treated later in the study. This variation is likely due to the surgeon's experience, highlighting the importance of the learning curve in laparoscopic nephrectomy. El-Galley et al [6] reported that postoperative hospital stay was  $2\pm 2$  days after laparoscopic nephrectomy and  $3\pm 2$  days after open nephrectomy ( $P = .01$ ).

The authors of the present study also found that the mean postoperative hospital stay following laparoscopy was significantly shorter than the stay following open surgery (3.45 versus 4.9 days, respectively) ( $P = .004$ ). Ku et al [7] the findings indicated that the mean time to oral intake was shorter following laparoscopic nephrectomy. Nevertheless, the authors did not identify any significant differences between the groups concerning this measure. This observation may be linked to the development of ileus after the transperitoneal approach in patients who received laparoscopic treatment in this study.

Goel et al [8] reported that the complication rate from laparoscopy was 11% compared with 15% from open nephrectomy. In the present study, operative complications occurred in 6 patients (30%) receiving open surgery and in 5 patients (25%) receiving laparoscopy, with no significant difference between groups. In the group receiving laparoscopy, 81% of the complications occurred during the initial 5 cases, probably because the surgeon was less experienced.

Laparoscopic nephrectomy is recognized as an attractive and effective alternative to open surgical techniques. It enhances patient comfort, decreases the necessity for narcotic pain relief, improves cosmetic appearance, reduces the length of hospital stays, and allows for a faster return to regular activities. [4]. Performing laparoscopic radical nephrectomy on large tumors is a procedure that poses considerable technical difficulties. Nonetheless, with the expertise of seasoned professionals, it is a justifiable treatment option for the management of advanced renal cell carcinoma. [9]. Vanderbrink et al [10] It has been reported that nephrectomy, whether performed openly or laparoscopically, for xanthogranulomatous pyelonephritis (XGP) is among the most difficult surgical interventions, even for experienced surgeons. In another research effort, the authors of the current study advised that in laparoscopic cases involving patients with XGP, where dissection of the renal artery and vein proves challenging, the surgeon should first clamp and cut the vein, followed by ligating and cutting the artery. [11].

## CONCLUSION

This study demonstrated that there were no significant variations between laparoscopic and open nephrectomy concerning operation time, the length of postoperative NPO status, or the incidence of complications. It was found that the duration of laparoscopic procedures tends to decrease as the surgeon gains more experience. Furthermore, patients who underwent laparoscopic nephrectomy experienced a notably shorter hospital stay. As a minimally invasive technique, laparoscopic nephrectomy is recommended as an alternative to open surgery, even in more complex situations.

REFERENCES

1. Novick AC, Bishoff JT, Kavoussi LR. Open and laparoscopic surgery of the kidney. In: Wein AJ, Kavoussi LR, Novick AC, Partin AW, Peters CA, eds. *Campbell-Walsh Urology*. 9th ed. Philadelphia, PA: Saunders; 2007:1686-1810.

2. Salam YA, El Anany F, Latif AA, Latif HA, Ibrahim AF. Retroperitoneal laparoscopic nephrectomy versus open nephrectomy for benign renal disorders. *Arab J Urol*. 2005;3:12-16.

3. Clayman RV, Kavoussi LR, Long SR, Dierks SM, Meretyk S, Soper NJ. Laparoscopic nephrectomy: initial report of pelviscopic organ ablation in the pig. *J Endourol*. 1990;4:247-252.

4. Wolf SJ Jr, Stoller ML. Laparoscopic surgery. In: Tanagho EA, McAninch JW, eds. *Smithâ€™s General Urology*. 16th ed. New York, NY: McGraw-Hill; 2004:140-163.

5. Devoe WB, Kercher KW, Hope WW, Lincourt AE, Norton HJ, Teigland CM. Hand-assisted laparoscopic partial nephrectomy after 60 cases: comparison with open partial nephrectomy. *Surg Endosc*. 2009;23(5):1075-1080.

6. El-Galley R, Hood N, Young CJ, Deierhoi M, Urban DA. Donor nephrectomy: a comparison of techniques and results of open, hand assisted and full laparoscopic nephrectomy. *J Urol*. 2004;171(1):40-43.

7. Ku JH, Yeo WG, Choi H, Kim HH. Comparison of retroperitoneal laparoscopic and open nephrectomy for benign renal diseases in children. *Urology*. 2004;63(3):566-570.

8. Goel MC, Modlin CS, Mottoo AM, et al. Fate Of Donor Kidney: Laparoscopic Versus Open Technique. *J Urol*. 2004;172(6 Pt 1):2326-2330.

9. Rosoff JS, Raman JD, Sosa RE, Del Pizzo JJ. Laparoscopic radical nephrectomy for renal masses 7 centimeters or larger. *JSLs*. 2009;13(2):148-153.

10. Vanderbrink BA, Ost MC, Rastinehad A, et al. Laparoscopic versus open radical nephrectomy for xanthogranulomatous pyelonephritis: Contemporary outcomes

11. Falahatkar S, Nikpour S, Akbarpour M. New method in laparoscopic surgery of xanthogranulomatous pyelonephritis. *Pak J Med Sci*. 2007;23(6):953-955.

Table No. 2 Mean ± St. Deviations, Ranges for Operative Time, Hospital Stay and Duration of NPO state Open Nephrectomy and Laparoscopic Nephrectomy

Characteristic	Open Nephrectomy (n=40)			Laparoscopic Nephrectomy (n=40)			P-Value
	Mean	SD	Range	Mean	SD	Range	
Operative time (minutes)	180.45	39.50	125-250	190.60	96.60	90-300	0.590
Hospital Stay in days	5.6	2.30	6-9	4.69	2.90	3-7	.008
Duration of NPO state in Hours	29.8	15.66	8-80	35.60	29.60	30-80	0.593

Figure No. 3 Complications for Open Nephrectomy and Laparoscopic Nephrectomy

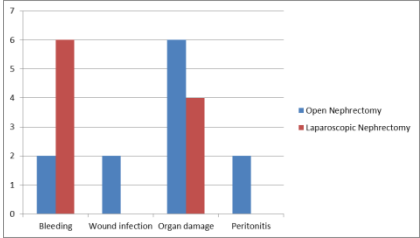


Figure No. 4 Treatment for Open Nephrectomy and Laparoscopic Nephrectomy

