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# Comparison of the Outcome of Laparoscopic Versus Open Nephrectomy in Non-Functioning Kidney

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## ARTICLE INFO

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## ABSTRACT

**Introduction:** Many traditional surgical intervention techniques have been superseded by endourological procedures in recent years. The primary factor contributing to surgeons' predilection for these surgical intervention techniques is their minimally invasive nature. This study was done to compare the outcome of Open surgery versus Laparoscopic surgery in patients undergoing nephrectomy. **Study design:** Randomized controlled trial. **Study Period:** November 23, 2024, to May 22, 2025. **Methodology:** There were 60 patients, of either gender, undergoing nephrectomy, ranging in age from 16 to 65. Patients with severe coagulopathies (INR>1.5), chronic renal failure were not included. The open approach was used to operate on patients in group A. Patients in group B had laparoscopic surgery performed on them. With the researcher's help, a single surgical team completed every procedure. Operative time was noted. Patients were then moved to post-operative wards and monitored until they were discharged. The length of hospital stay was recorded. **Findings:** Groups B and A in my study had average operational times of 111.23 ± 12.98 and 86.13 ± 9.58 minutes, respectively. Group A's mean hospital stay was 2.46 ± 0.81 days (p-value = 0.0001), whereas Group B's was 1.90 ± 0.80 days. 3.33% of patients in laparoscopic and 13.33% of patients in open group, respectively, suffered bleeding, per my research (p-value = 0.161). Wound infections affected 3.33% of patients in laparoscopic group and 13.33% of patients in open group (p-value = 0.161). Organ damage was present in 0.0% of patients in laparoscopic group and 6.67% of patients in open group (p-value = 0.150). **Conclusion:** This study came to the conclusion that, for patients having nephrectomy, laparoscopic surgery produces better results than open surgery.

## INTRODUCTION

In order to treat a variety of renal pathologies, such as renal cell carcinoma, renal trauma, and non-functioning kidneys brought on by chronic illnesses like diabetes and hypertension, nephrectomy—the surgical removal of a kidney—remains a fundamental treatment option.[1] Minimally invasive procedures, such as laparoscopic nephrectomy, have been developed as a result of improvements in surgical techniques throughout time. These procedures may have benefits over open surgery.[2] Since it gives surgeons direct access to the kidney and surrounding structures, open nephrectomy has long been accepted as the accepted surgical method for nephrectomy. It is linked to substantial morbidity, though, such as increased blood loss, extended hospital stays, and postoperative pain, which raises the need for transfusions. Furthermore, larger incisions are frequently made during an open nephrectomy, which increases postoperative discomfort and slows healing.[3] The benefits of the laparoscopic method are clear. The advantages of laparoscopic nephrectomy include improved cosmetics, shorter recovery times, fewer blood transfusions, fewer post-operative analgesic needs, early mobility and oral feeding, an earlier return to work, and fewer serious intra-operative and post-operative problems.[4,5]

In a study[6], the open nephrectomy procedure took considerably less time to complete than the laparoscopic procedure (147.9 ± 34.2 vs. 184.6 ± 33.3 min; p=0.004). Patients who underwent open surgery had a considerably longer mean length of stay in the hospital after surgery than those who underwent laparoscopy (7.06 ± 3.67 days vs. 3.92 ± 0.86 days; p = <0.001). 6 The open nephrectomy group experienced 52.9% of post-operative problems, while the laparoscopic nephrectomy group experienced

23.1%.[6] Both groups had a considerable decrease in pain. The laparoscopic nephrectomy group's VAS was significantly lower than the open nephrectomy group's in every follow-up.[6] Less blood loss (54.75 vs. 359.24 ml), fewer postoperative complications (20.4% vs. 51.4%), shorter hospital stays (02.6 vs. 03.8 days), shorter operative times (125.4 vs. 145.2 minutes), and better pain management (06.8% vs. 96.4%) were some of the benefits of laparoscopic nephrectomy over open nephrectomy that were shown in another study.[7] A local study[8] found that the average operating time for a laparoscopic nephrectomy was 130.9 minutes, while the average operating time for an open nephrectomy was 160.5 minutes. During open and laparoscopic nephrectomy, the average blood loss was 361.25 ml and 59.86 ml, respectively.[8] During open and laparoscopic nephrectomy, the rates of blood transfusion were 55% and 10.5%, respectively (p=0.001). Overall, the rates of post-operative complications for both open and laparoscopic procedures were 52.5% and 21.5%, respectively. 7.9% of patients who had a laparoscopic procedure and 97.5% of patients who had an open procedure reported experiencing post-operative pain. Following laparoscopic and open procedures, fever was observed in 26.3% and 62.5% of patients, respectively (p=0.001). The average length of stay in the hospital was 2.8 days for the laparoscopic procedure and 4.5 days for the open procedure.[8]

The goal of this study is to compare laparoscopic versus open nephrectomy in non-functioning kidneys since post-operative morbidity after any surgical operation is crucial because it impacts patients both physically and psychologically. Even if prior research has indicated that laparoscopic nephrectomy is the superior choice, there is a need for this kind of study in our population because there isn't much local literature on the subject. In order to lower the morbidity of our population, an audit of both of these techniques can then be conducted in our population. Based on the results, these specific patients can be given a more effective approach that is linked to less post-operative discomfort.

## MATERIAL AND METHODS

This randomized clinical trial was carried out from November 23, 2024, to May 22, 2025, at the outpatient Urology Department of Shahida Islam Teaching Hospital in Lodhran and the Bahawal Victoria Hospital in Bahawalpur. A successive non-probability sampling procedure was used to choose a sample of 60 patients. With a 95% confidence level, 80% study power, and the magnitude of the mean hospital stay—7.06 ± 3.67 days with the open procedure and 3.92 ± 0.86 days with the laparoscopic method—the sample size of 60 cases, 30 in each group, is determined.[6] Patients of either gender between the ages of 16 and 65 who were having a non-functional kidney removed were eligible to participate. Patients with severe coagulopathies (INR>1.5), chronic diseases such as chronic liver disease, chronic renal failure, or H/O, as well as those with malignant illness or metastases, were not included. The Institutional Ethical Review Committee gave its approval before requesting the patients' consent.

The selected patients were split into two groups, Group A and Group B, using the lottery method. Each selected instance was assigned to the proper group after having the chance to choose a slip from the total number of mixed-up slips (half-slips with the letter "A" and other half-slips with the letter "B"). Group A patients underwent open nephrectomy, and Group B patients underwent laparoscopic nephrectomy. Additionally, the procedure was conducted by a single consultant surgeon with at least three years of post-fellowship experience. Blood loss at the conclusion of surgery was recorded, as was the operating time (the interval between skin incision and skin closure). Patients were then moved to post-operative wards and monitored until they were released. The length of hospital stay, expressed in days from the day of operation to the day of ward discharge, was recorded. At 24 hours, post-operative discomfort was seen. After seven days of follow-up in the OPD, the patients' final results were recorded. Patients were checked for any post-operative complications during the follow-up period. A pre-made proforma was used to record the data for both groups.

The data was entered and analyzed using SPSS version 25.0. The mean and standard deviation or median (IQR) were shown for age, BMI, duration of illness, duration of operation, and length of hospital stay. Frequency and percentage were calculated for gender, side effected, and outcomes, including post-operative bleeding (yes/no) and complications (yes/no). Mean operative time, and hospital stay were compared using the independent samples t-test, while post-surgical bleeding and complications were evaluated using the chi-square test/Fisher exact test. P-values less than 0.05 were deemed significant.

## RESULTS

The study's participants ranged in age from 16 to 65, with a mean age of 37.18 ± 7.68 years. Patients in groups A and B had mean ages of 37.37 ± 7.63 and 37.10 ± 7.81 years, respectively. With a male to female ratio of 2.2:1, 41 (68.33%) of the 60 patients were men and 19 (31.67%) were women. The sickness lasted 30.19 ± 4.82 mm on average. The average BMI was 28.75 ± 3.59 kg/m$^2$. Table I displays the patient distribution by side affected.

The mean operating time in my study was 86.13 ± 9.58 minutes for group A and 111.23 ± 12.98 minutes for group B. According to Table II, the mean hospital stay for groups A and B was 2.46 ± 0.81 and 1.90 ± 0.80 days, respectively (p-value = 0.0001). According to my research, 13.33% of patients in group A and 3.33% of patients in group B experienced bleeding (p-value = 0.161). 13.33% of patients in group A and 3.33% of patients in group B had wound infections (p-value = 0.161). According to Table III, 6.67% of patients in group A and 0.0% of patients in group B had organ damage (p-value = 0.150).

**Table 1**

*Distribution of Patients according to Side Affected.*

| Side | Group A (n=30) | | Group B (n=30) | | Total (n=60) | |
|---|---|---|---|---|---|---|
| | Frequency | %age | Frequency | %age | Frequency | %age |
| Right | 14 | 46.67 | 13 | 43.33 | 27 | 45.0 |
| Left | 16 | 53.33 | 17 | 56.67 | 33 | 55.0 |

**Table 2**

*Comparison of Operative Time and Hospital Stay in Both Groups.*

| Outcome | Group A (n=30) | Group B (n=30) | p-value |
|---|---|---|---|
| | Mean ± SD | Mean ± SD | |
| Operative time (minutes) | 86.13 ± 9.58 | 111.23 ± 12.98 | 0.0001 |
| Hospital stay (days) | 2.46 ± 0.81 | 1.90 ± 0.80 | 0.0001 |

**Table 3**

*Comparison of Complications in Both Groups.*

| Outcome | Group A (n=30) | | Group B (n=30) | | p-value |
|---|---|---|---|---|---|
| | Yes | No | Yes | No | |
| Bleeding | 04 (13.33%) | 26 (86.67%) | 01 (3.33%) | 29 (96.67%) | 0.161 |
| Wound infection | 04 (13.33%) | 26 (86.67%) | 01 (3.33%) | 29 (96.67%) | 0.161 |
| Organ damage | 02 (6.67%) | 28 (93.33%) | 00 (0.00%) | 30 (100.0%) | 0.150 |

## DISCUSSION

Minimally invasive techniques have become more popular than open surgery in recent years due to technological developments. When compared to open nephrectomy, laparoscopic nephrectomy offers several advantages, including a quicker recovery period, a reduced need for analgesics, a quicker return to normal activities, and improved visual appeal.[9] Due to improvements in clinical practice, laparoscopic nephrectomy is currently the main treatment for patients with non-functional kidney disease who have severe renovascular hypertension, frequent infections, and severe lumbar discomfort. There are two methods for doing a laparoscopic nephrectomy: retroperitoneal and transperitoneal. Although fibrotic tissue dissection in a small surgical area can make retroperitoneal access difficult, it enables timely care of the renal pedicle. Skilled surgeons can successfully execute retroperitoneal laparoscopic uncomplicated nephrectomy with fewer problems.[10] In the meanwhile, the transperitoneal approach is frequently used for kidney surgery to treat inflammation. The transperitoneal method is comfortable due to the large operative area and the surgeon's familiarity with anatomical landmarks.[10]

In the current study, laparoscopic and simple open nephrectomy were compared for surgical outcome and complications. Male patients were more likely than female patients to get a nephrectomy in the current observation. In the same way, the majority of patients receiving donor nephrectomy—69.4%—are male, according to a research by Ölçücüoğlu.[11]

Laparoscopic nephrectomy had a considerably lower surgical operating time (90.60 ± 15.99 minutes vs. 133.64 ± 10.57 minutes; p = 0.001) than simple open nephrectomy. The operating time difference between laparoscopic and open nephrectomy was significant (p = 0.01), following a recent meta-analysis study by Wang et al.[12] There were no appreciable variations in the operating time between laparoscopic and simple open nephrectomy, according to a meta-analysis research by You et al.[13] (p = 0.13), Singh and Urry[14] (113 vs 111 minutes; p > 0.05), and Falahatkar et al.[14] (188 vs 176.25 minutes; p = 0.57).

According to the current study, laparoscopic nephrectomy results in a significantly shorter hospital stay than simple open nephrectomy (3.40 ± 0.12 vs. 5.48 ± 0.16 days; p = 0.001). The hospital stay was shorter for laparoscopic procedures than for open procedures for a variety of causes in a study by Falahatkar et al.[15] (3.45 vs 4.9 1 days; p = 0.004), Murtaza et al.[9] (3.30 vs 5.5 days; p < 0.0001), and Ganpule et al.[16] (5.72 vs 9.18 days; p < 0.001). Strict bowel preparation, precise analgesia regimes, and enhanced quality of life are some of the elements that contribute to the shorter hospital stay following laparoscopic nephrectomy.

Early drain removal and a low infection rate may have contributed to the shorter hospital stays in our study for patients who had laparoscopic nephrectomy.[17] 3.33% of patients in group B and 13.33% of patients in group A, respectively, suffered bleeding, per my research (p-value = 0.161). Wound infections affected 13.33% of patients in group A and 3.33% of patients in group B (p-value = 0.161). Organ damage was present in 0.0% of patients in group B and 6.67% of patients in group A (p-value = 0.150). Similarly, a research by Murtaza et al. (2010)[9] found that the incidence of complications was significantly lower with laparoscopic nephrectomy than with simple open nephrectomy (16.7 vs. 26.7%; p < 0.05).

Chen et al.[18] conducted a meta-analysis and found that laparoscopic nephrectomy had fewer problems than open surgeries (OR 0.59, 95% CI, 0.40–0.86; p = 0.007). Laparoscopic surgery had a significantly lower incidence of postoperative problems than open surgery (19.5 vs. 47.8%; p = 0.004), according to another study by Liu et al.[19] In a recent study by Lyu et al.[20], the Clavien-Dindo scoring for surgical cause complications was lower in laparoscopic procedures than in open procedures (5 vs 23; p < 0.001). According to Momin et al.[21], the DMSA scan is the preferred method for assessing renal function, and both the 99mTc-DMSA and 99m Tc-DTPA scans yield comparable findings.

According to one study[22], laparoscopic nephrectomy took a lot less hospital stay i.e. 3.40 ± 0.12 days than open nephrectomy (5.48 ± 0.16 days), and operative time (90.60 ± 15.99 vs 133.64 ± 10.57 minutes; p = 0.001). Compared to simple open nephrectomy, the rate of complications was reduced with laparoscopic nephrectomy (12 vs. 36%).[22]

### Limitations of the study

A survey to gauge the level of pain. In the future, the same groups may receive multiple questionnaires. However, groups can contain more samples because of their small sample size.

## CONCLUSION

According to the findings of this study, patients having nephrectomy fare better with laparoscopic surgery than with open surgery. Therefore, in order to lower the patients' morbidity, we advise that laparoscopic surgery be performed frequently on patients having nephrectomy.

## REFERENCES


1. Ames KS Baky F Blair S. Simple nephrectomy in a tertiary care safety net hospital—Patient characteristics, causes, cost, and renal function implications. Urol. 2021;149:98–102. https://doi.org/10.1016/j.urology.2020.12.013
2. Singh A, Urry RJ. Laparoscopic versus open nephrectomy in resource-constrained developing world hospitals: a retrospective analysis. Afr J Urol. 2020;26:85. https://doi.org/10.1186/s12301-020-00096-9
3. Kızılay F, Turna B, Apaydın E, Semerci B. Comparison of long-term outcomes of laparoscopic and robot-assisted laparoscopic partial nephrectomy. Kaohsiung J Med Sci. 2019;35(4):238-43. https://doi.org/10.1002/kjm2.12038
4. Bravi CA, Larcher A, Capitanio U, Mari A, Antonelli A, Artibani W, et al. Perioperative outcomes of open, laparoscopic, and robotic partial nephrectomy: A prospective multicenter observational study (The RECORd 2 Project). Eur Urol Focus. 2021;7(2):390-6. https://doi.org/10.1016/j.euf.2019.10.013
5. Ali M, Khalid A, Sajjad K. Initial experience of laparoscopic nephrectomy for nonfunctioning kidney in Recep Tayyip Erdogan Hospital, Muzaffargarh. Professional Med J. 2023;30(04):446-50. https://doi.org/10.29309/tpmj/2023.30.04.7303
6. Alam MN, Alam MS, Islam KN, Miah MLR. Laparoscopic versus open simple nephrectomy our initial experiences. Bangladesh J Urol. 2020;23(1):52-55. https://doi.org/10.3329/bju.v23i1.50290
7. Khan SA, Nawaz A, Hamid MS, Akbar S, Waqas M. Outcomes of nephrectomy approaches: open vs. Laparoscopic in 156 patients a cross sessional study. J Population Therap Clin Pharmacol. 2022;29(2):364-9.
8. Nawaz A, Manan F, Minallah N, Bibi R, Rehman KU. Comparison of surgical outcome of open versus laparoscopic nephrectomy. J Rawalpindi Med Coll. 2022;26(3):389-94.
9. Murtaza G, Muhammad H, Zaki R. Comparative study between operative procedures of laparoscopic nephrectomy with open nephrectomy in cases of benign kidney diseases, outcome and complications: A single center experience. Pakistan J Med Heal Sci 2019;13(3):640–643. https://pjmhsonline.com/2019/ july sep/pdf/640.pdf.
10. Kurt O, Buldu I, Turan C. Does laparoscopic transperitoneal simple nephrectomy for inflammatory and non-inflammatory kidneys differ? Springerplus. 2016;5(1):1358. https://doi.org/10.1186/s40064- 016-2945-3.
11. Ölçücüoğlu E. Comparing the complications of laparoscopically performed simple, radical and donor nephrectomy. Turk J Med Sci. 2020;50(4):922–929. https://doi.org/10.3906/sag-1910–120.
12. Wang D, Xiao Z, Shou J. Comparison of laparoscopy and open radical nephrectomy of renal cell cancer. Open Med. 2019;14(1): 392–397. https://doi.org/10.1515/med-2019-0040.
13. You C, Du Y, Wang H. Laparoscopic versus open partial nephrectomy: A systemic review and meta-analysis of surgical, oncological, and functional outcomes. Front Oncol. 2020;10:583979. https://doi.org/10.3389/fonc.2020.583979.
14. Singh A, Urry RJ. Laparoscopic versus open nephrectomy in resource-constrained developing world hospitals: A retrospective analysis. African J Urol. 2020;26(1):85. https://doi.org/10.1186/s12301-020-00096-9.
15. Falahatkar S, Enshaei A, Allahkhah AA. Comparison of open vs laparoscopic nephrectomy: Outcomes and complications. UroToday Int J. 2010;03(01):1–6. https://doi.org/10.3834/uij.1944-5784.2010.02.01.
16. Ganpule AP, Sharma R, Thimmegowda M. Laparoscopic radical nephrectomy versus open radical nephrectomy in T1-T3 renal tumors: An outcome analysis. Indian J Urol. 2008;24(1):39–43. https://doi.org/10.4103/0970-1591.38602.
17. Antonicelli A, Monaco F, Carretta A. Chest drainage therapy: what comes out of pandora's box can affect patient outcomes. J Clin Med 2022;11(18):5311. https://doi.org/10.3390/jcm11185311.
18. Li KP, Chen SY, Wang CY. Comparison between minimally invasive partial nephrectomy and open partial nephrectomy for complex renal tumors: A systematic review and meta-analysis. Int J Surg 2023;109(6):1769–1782. https://doi.org/10.1097/JS9.0000000000000397.
19. Liu Z, Zhao X, Ge L. Completely laparoscopic versus open radical nephrectomy and infrahepatic tumor thrombectomy: Comparison of surgical complexity and prognosis. Asian J Surg 2021;44(4):641–648. https://doi.org/10.1016/j.asjsur.2020.12.003.
20. Lyu J, Du CK, Zhu Y. Comparison between retroperitoneal laparoscopic nephrectomy and traditional open nephrectomy to treat polycystic kidney disease before kidney transplantation. Urol J 2023;20. https://doi.org/10.22037/uj.v20i.7826.
21. Momin MA, Abdullah MNA, Reza MS. Comparison of relative renal functions calculated with 99mTc-DTPA and 99mTc-DMSA for kidney patients of wide age ranges. Phys Medica 2018;45:99–105. https://doi.org/10.1016/j.ejmp.2017.12.005.
22. Prasanth Kumar SU, Senthilkumar T, Rohitha RS. Comparative study of outcome and complications of laparoscopic and open simple nephrectomy in patients with non-functioning kidneys. World J Lap Surg 2024;17(3):149–52.