

# Comparative study between operative procedures of Laparoscopic Nephrectomy with open Nephrectomy in cases of Benign Kidney Diseases, outcome and complications: A single center experience

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## ABSTRACT

**Aim:** Comparison between laparoscopic Nephrectomy and open for non functioning kidneys due to benign diseases of kidney in our center. We compared out come and complications of the both procedures

**Methodology:** A Quasai experimental study was conducted at Department of Urology & Renal Transplantation of Sharif Medical City Hospital Raiwind road Lahore from 1<sup>st</sup> December 2016 to 1<sup>st</sup> December 2017 after fully informed consent. Sample size was of sixty patients. We divided them in group A and group B comprising of thirty patients in each group on the basis of  $GFR \leq 10\text{ml/hour}$  by doing DTPA renal scan of affected side with normal contralateral kidney. Patients were admitted through OPD. Purposive convenient sampling was made. Data was collected on annexured performa. Data was entered and analyzed by using computer programme SPSS

**Results:** Per-operative blood loss of patients in group B (open Nephrectomy) had significantly high volume than laparoscopic Nephrectomy group A. (P value 0.043). More blood transfusion was required in group B (open Nephrectomy) P value < 0.05. There was absolutely, perfectly same matching in drainage tube used for the both groups. (P value 1.00). No time difference found statistically between two procedures. In group A, large number of patient's required low dosage of post operative analgesia, while a significantly higher number of patients in group B needed higher dosage of analgesia (P value < 0.05). Group B patients hospital stay was significantly higher than group A. The recovery time to normal working for group B patients was prolonged significantly no difference (P value 0.130). Three cases of Laparoscopic Nephrectomy were converted into open Nephrectomy (10%)

**Conclusion:** We concluded that Laparoscopic Nephrectomy had less morbidity with more benefits.

**Keywords:** Laparoscopic Nephrectomy, non functioning kidney DTPA Renal Scan, Benign Renal Disease.

## INTRODUCTION

Definitive renal surgery a planned Nephrectomy was first performed in 1869 for treatment of a ureterovaginal fistula. In 1881, first Nephrolithotomy was performed in an otherwise healthy kidney and the terms nephrolithiasis, Nephrolithotomy, Nephrectomy and nephrotomy were defined. In 1898, the history of kidney surgery, which originated in the need to drain large perinephric abscesses that pointed in the lumbar triangle, was reviewed. There was great controversy among early surgeons regarding the relative merits of retroperitoneal versus transperitoneal exposure of kidney. An anterior transperitoneal Nephrectomy through a midline incision was performed as early as 1878. In transperitoneal simple Nephrectomy, a subcostal incision is made to enter the peritoneal cavity. The renal vein and artery are mobilized, ligated and transected. The artery is occluded first to avoid excessive blood loss into the kidney. In 1965, a blood-less plane that lay between the fat of the renal sinus and the muscular wall of the renal pelvis was discovered. Surgical treatment of the symptomatic nonfunctioning kidney is open Nephrectomy; either open or laparoscopic, indication is same as in minimal invasive surgery. The foundation of modern laparoscopy was laid in 1805, glass optics for magnification were introduced. In 1938 a spring loaded needle was reported, which became the standard for closed insufflations of the abdomen. In 1974, the open

concept to approach peritoneal cavity for introduction of first trocar was given. , thereby reducing the incidence of potential complications<sup>2</sup>.

In 1991 first laparoscopic Nephrectomy for non functioning kidney was done. It can be performed safely in most cases of benign and malignant renal conditions while laparoscopic live kidney donation evolved rapidly. Clear benefits of laparoscopy verses open Nephrectomy are less blood loss, decrease in post operative pain, faster recovery, hospital stay is short, resumption of routine activities earlier, with cosmetically improvement. Laparoscopic Nephrectomy also results in fewer complications but benefits outweigh the higher hospital costs then open nephrectomy<sup>5</sup>.

The laparoscopic live donor Nephrectomy has evolved now and acceptable now with reference to renal artery, renal vein with length and ureter. It is more acceptable in the World at different centers for live donors and recipients<sup>6</sup>. Laparoscopic Nephrectomy for donors can be modified as a choice for retrieval of kidney. Complications can occur in early cases of a surgeon during learning curve but reduce with experience. The complication rate of laparoscopic Nephrectomy ranges from 8 to 17% - major complications are 9.5% and minor 1.9%<sup>9</sup>. Intra – operative and post-operative transfusion rate was 1.9%<sup>10</sup>. Out of major complications, predominant was bleeding which required conversion to open. Rate of conversion is 1.7 to 4% and mortality rate is 0%<sup>11</sup>. Laparoscopic Nephrectomy is feasible and safe technique with short convalescence<sup>12</sup>.

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**METHODOLOGY**

This quasi experimental study was conducted at Sharif Medical and Dental College Raiwind road Lahore during a period of one year between 1<sup>st</sup> December 2016 – 1<sup>st</sup> December 2017. Non-probability purposive sampling was made. Sixty patients with non functioning kidney with contralateral normal kidney Patients coming in Urology OPD were admitted in the Department of Urology on the basis of DTPA renal scan. We divided in two groups by using a random number table. Each group was comprised of thirty patients. Group A was comprised of thirty consecutive patients planned for laparoscopic Nephrectomy while Group B was comprised of second consecutive thirty patients planned for Open Nephrectomy. An informed consent was taken for either of the two surgical procedures by using their data. Data was collected through a structure performa. Symptomatic patients with non function kidneys (NFK)  $\leq$  10ml/min of affected side with normal functioning on the basis of DTPA renal scan may be due to stone diseases with out infection. Non functioning pelvis kidneys, pyonephrotic kidneys were excluded. Outcome variables and complications for both the procedures recorded. Time of operation, blood loss volume per – operatively, blood transfusion requirement , analgesia requirement post – operatively, time to oral intake, stay in the hospital, return to routine activities time , laparoscopic surgery converted in to open, pneumothorax, re-do surgery and wound infection. The data was entered and analyzed by using computer programme using SPSS version 21.

**RESULTS**

In 60 patients Nephrectomy was performed: 30 patients had laparoscopic while other 30 patients had open. Demographic details of patients are with table 1 & 2. In group A, mean age was 29.93 $\pm$ 12.3 and 38.07 of group B. No age difference significantly mean age (p = 0.074) in all patients who underwent Laparoscopic and open Nephrectomy. Fourteen male (46.7%) and 16 female (53.3%) were in group A (laparoscopic) and 18 male (60%) and 12 female (40%) in group B (open procedure). Ratio between male and female was 1: 1.14 and 3:2 respectively. There is no statistically difference (Table 2).

The complaints of pain, mild in 5 patients (16.7%) of group A, 1 patient (3.3%) was in group B, moderate 12 (40.0%), 16(53.3%) and severe 13(43.3%), 13(43.3%) in group A and group B respectively, p value was 0.371, there is not significant (Table 3).

Social economic status of patients of two groups was above average 1 patient in group A (3.3%) while 1 patient in group B (3.3%). The average status in group A was (40.0%) in 12 patients while 11 patients of group B (36.7%). Below average was 11 patients (36.7%) and 4 patients (13.3%) in group A and group B respectively. There was poor status in 6 patients (20.0%), 14 patients (46.7%) in group A, B respectively (Table 4). Mean GFR of right kidney was 34.46 $\pm$ 27.7 ml (0-76 ml), 30.22 $\pm$ 27.27.04ml (0-74ml) in group B. The p value was 0.610; there is not significant (table5).

The mean GRF of left kidney was 27.62 $\pm$ 28.05ml (the range was 0-97.3ml) in group A, 28.81 $\pm$ 27.86ml (range 0-

80ml), p value was 0.882 that is not statically significant (Table 6).

Drainage tube used in group A and group B, 25 patients (83.3%) in each. The p value was 1.00(Table 7).

In the group A, 30 procedures was laparoscopic. Open nephrectomies were performed in 30 patient also. The average blood loss was 158.6735.72ml in group A while in group B there was less blood loss preoperatively in patients who underwent laparoscopic Nephrectomy significantly 231.061.19ml in group B (p=0.043) (Table 8). In open Nephrectomy, preoperative blood transfusion was required in 36.7% with conversion to 16.7% for laparoscopic. (P<0.05, statically significant) (table 9).

Procedures performed laparoscopically, time of operation was statistically no difference (113.6726.88 min, range 75-165 min) than with open surgery ( 125.67 $\pm$ 27.03 min, range 70-165 min, p = 0.07) (Table 10).

The average hospital stay in group A ( laparoscopic procedure ) was 3.30 $\pm$  1.74 days ( range 2-8 days) and 5.5 $\pm$  1.31 (range 3-9days) in group B (open procedure). Those patients who underwent laparoscopic Nephrectomy, hospital stay was less on average 2days. P <0.001 the difference was significant in two procedures statistically (table 12)

Time required to return on routine activities was more in those patients who underwent for open surgery. Group A (laparoscopic) was 2.7 $\pm$ 1.76 weeks and 3.2 $\pm$ 0.66 weeks in group B (open procedure) but there was no statically significant difference (Table 13).

Overall morbidity was less in patients associated with Laparoscopic Nephrectomy than open cases. It proves true for other postoperative complications (16.7% vs 26.7%, p <0.05). There were three conversions (10.0%) (Table 14).

Table 1: Age distribution of patients of two groups (n=60)

Age (Years)	Group I	Group-II
6-15	4(13.3%)	5(16.7%)
16-30	11(36.7%)	5(16.7%)
31-45	13(43.3%)	9(30.0%)
46-60	2(6.7%)	8(26.7%)
61-75	-	3(10.0%)
Total	10(50%)	30(50%)
Mean (Range)	29.93 $\pm$ 12.30 (10-50 years)	38.07 $\pm$ 18.07 (6-70years)
P value	0.074	

Table 2: Sex distribution of patients of two groups (n=60)

Sex	Group I	Group II
Male	14(46.7%)	18(60.0%)
Female	16(53.3%)	12(40.0%)
Total	30(50%)	30(50%)
Male to Female ratio	1 : 1.14	3 : 2
P value	0.285 (N.S)	

Table 3: Pain distribution of patients of two groups (n=60)

	Group I	Group II
Mild	5 ( 16.7%)	1 (3.3%)
Moderate	12(40.0%)	16(53.3%)
Severe	13(43.3%)	13(43.3)
Total	30(50%)	30(50%)
P value	0.371	

Table 4: Social economic status of patients of two groups (n=60)

Status	Group I	Group II
Above Average	1(3.3%)	1(3.3%)
Average	12(40.0%)	11(36.7%)
Below average	11(36.7)	4(13.3%)
Poor	6(20.0%)	14(46.7%)

P> 0.05

Table 5: GFR of right kidney of patients of two groups (n=60)

Rate	Group I	Group II
0-20	13(43.3%)	14(46.7%)
21-40	1(3.3%)	1(3.3%)
41-60	11(36.7%)	12(10.0%)
61-80	5(16.7%)	3(10.0%)
Mean $\pm$ SD (Range)	34.46 $\pm$ 27.7(0-76)	30.22 $\pm$ 27.04(0-74)
P value	0.610 (N.S)	

Table 6: GFR of left kidney of patients of two groups (n=60)

Rate	Group I	Group II
0-20	17(56.7%)	16(53.3%)
21-40	1(3.3%)	1(3.3%)
41-60	8(26.7%)	8(26.7)
61-80	3(10.0%)	5(16.7)
81-100	1(3.3%)	-
Mean $\pm$ SD (Range)	27.62 $\pm$ 28.05(0-97.3)	28.81 $\pm$ 27.86(0-80)
P value	0.882 (N.S)	

Meeting the inclusion criteria

Table 7: Drainage tube used of patients of two groups (n=60)

Drainage tube	Group I	Group II
Yes	25(83.3%)	25(83.3)
No	5(16.7%)	5(16.7%)
P value	1.00	

Absolutely, perfectly same matching , No difference

Table 8: Per-operative blood loss of patients of two groups (n=60)

Blood loss (ml)	Group I	Group II
40-100	15(50.0%)	9(30.0%)
101-200	9(30.0%)	8(26.7%)
201-300	2(6.7%)	6(20.0%)
301-400	2(6.7%)	3(10.0%)
401-500	1(3.3%)	1(3.3%)
501-600	1(3.3%)	3(10.0%)
Mean $\pm$ SD (range)	158.67 $\pm$ 135.72(40-575ml)	231.0 $\pm$ 163.19(40-600ml)
P value	0.043	

Significantly high volume of blood in group II.

Table 9: Blood transfusion of patients of two groups (n=60)

Blood transfusion	Group I	Group II
One	2(6.7%)	10(33.3%)
Two	2(6.7%)	1(3.3%)
Three	1(3.3%)	-
P value	<0.05	

Fisher's exact test., More transfusion was required in group II.

Table 10: Operative time of patients of two groups (n=60)

Operative time (minutes)	Group I	Group II
70-100	15(50.0%)	8(26.7%)
101-125	4(13.3%)	5(20.0%)
126-150	9(30.0%)	13(43.3%)
151-175	2(6.7%)	4(13.3%)
Mean $\pm$ SD(range)	113.67 $\pm$ 26.88(75-165minutes)	125.+6727.03(70-165minutes)
P value	0.070	

There was no statistically significant time difference used in the two procedures.

Table 11: Post analgesia of patients of two groups (n=60)

Post analgesia (mg)	Group I	Group II
5-20	26(86.7%)	8(26.7%)
21-40	3(10.0%)	14(46.7%)
41-60	1(3.3%)	7(23.3%)
>60	-	1(3.3%)
Mean $\pm$ SD (range)	13.97 $\pm$ 8.77(5-50)	35.83 $\pm$ 20.72(10-120)
P value	<0.05	

In group I, large number of patients required low dosage of analgesia, while a significantly higher number of patients in group II needed higher dosage of analgesia.

Table 12: Hospital stay of patients of two groups (n=60)

Hospital stay (days)	Group I	Group II
1-2	12(40.0%)	-
3-4	14(46.7%)	5(20.0%)
5-6	1(3.3%)	20(66.7%)
>6	3(10.0%)	5(20.0%)
Mean $\pm$ SD (Range)	3.30 $\pm$ 1.74(2-8days)	5.5 $\pm$ 1.31(3-9days)
P value	<0.001	

Group II patients had a significantly higher duration of stay than in group I.

Table 13: Time to return to work of patients of two groups (n=60)

Time (weeks)	Group I	Group II
1-2	21(70.0%)	4(13.3%)
3-4	6(20.2%)	26(86.7%)
5-6	-	-
7-8	3(10.0%)	-
Mean $\pm$ SD (range)	2.7 $\pm$ 1.76(1-8weeks)	3.2 $\pm$ 0.66(2-4weeks)
P value	0.130	

The time to return to normal activities was longer for patients in group II while did not differ significantly in the two groups.

Table 14: Conversion and complication of two procedures (n=60)

	Group I	Group II
Conversion	3(10.0%)	-
P value	0.083	
Complications	5(16.7%)	8(26.7%)
P value	<0.05	

## DISCUSSION

Laparoscopy has raised great interest in the past few years in the field of urology. It has evolved from a single diagnostic manoeuvre to complex operation procedures. The basic surgical technique of laparoscopic Nephrectomy has been described in detail by Clayman and Gill [12].

They performed first time in 1991 laparoscopic Nephrectomy through transperitoneal approach. First of all in various studies compression between standard laparoscopic Nephrectomy and open Nephrectomy was done, which showed less morbidity in laparoscopic group like early recovery, reduced pain post operatively, less blood loss preoperatively, minimal need of analgesia but a few complications were reported. Our series of 60 cases showed equivalent clinical outcome with reference to previous studies in our single center institution<sup>[13]</sup>.

In our series conversion was (10.0%), which is low while 12% is reported in literature. [14] and mortality rate was 0%<sup>[14]</sup>.

For live donor Nephrectomy, the University of Maryland experience is the benchmark for comparison. In the initial group of 70 patients undergoing laparoscopic donor Nephrectomy, 94% were completed successfully. When compared with a case-matched control group of 65 patients treated with open surgery, blood loss, length of hospital stay, narcotic requirements, resumption of diet, and return to normal activity were all significantly less in the laparoscopic group. [4]

Our data is same to the already published studies. Laparoscopic Nephrectomy should be applicable where indication is justified for kidney removal. It is indicated for live related kidney donation to recipient with end stage renal disease. Kerble K et.al. in their comparative study of open Nephrectomy narrated more operative time but decrease in post operative ileus which was significant. However length of hospital stay and oral analgesic requirement with convalescence was comparable in both groups. They quoted 15% complications in laparoscopic patients and 0% in open patients. Incidence of complications remained high in initial learning curve. While in series of 60 cases complication rate was 16.7% in laparoscopic group and 26.7% was in open surgical group [15].

Kercher K.W et.al. cited blood loss (97ml vs 216ml, P=0.0001) length of hospital stay (3.9 days vs 5.9 days, P=0.0001) laparoscopic and open Nephrectomy. While in our study per-operative blood loss was 158.67±135.72(40-575ml) vs 231.0±163.19(40-60ml), P=0.043 and hospital stay 3.30± 1.74(2-8days) vs 5.5± 1.31(3-9 days), P=<0.001 respectively in open and laparoscopic Nephrectomy [5].

In a study, the mean time of operation in donor Nephrectomy performed laparoscopically was 13 minutes more than open Nephrectomy. We observed statistically no difference in linear decrease of operative time. In a study, the mean operative time (126 and 118 minutes, in laparoscopy and open group respectively). [13]

The patient outcome is improved in laparoscopic Nephrectomy and is a better choice in elective surgery as is the desire of patient and referring physician of minimum surgical trauma. It is the procedure of choice in our institution which is justifiable in laparoscopic Nephrectomy [15].

In our experience, laparoscopic Nephrectomy has improved patient outcomes, has increased overall case volume. Within 2 years of its introduction, laparoscopic Nephrectomy has become the procedure of choice for elective Nephrectomy in our institution. Although this technique is associated with longer operative time, we believe that its use can be justified on the basis of significant reductions in overall morbidity and a more rapid return to a normal, productive life<sup>[14]</sup>.

## CONCLUSION

Laparoscopic Nephrectomy for live related donors should be offered to every donor as he or she is not a patient. They are privileged for minimal invasive surgery, which accounts for less morbidity, early recovery, good productive life with better quality of life and better cosmesis which is appreciated in laparoscopic group.

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