

Analysis of 87 Nephrectomies in a Tertiary Healthcare Center in Nigeria

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Abstract

Background: Nephrectomy is one of the most frequently performed operations on the kidney. It is necessary for treatment of malignant as well as some benign renal conditions.

Methodology: This was a five-year retrospective review of all adult patients who had open nephrectomy in Lagos University Teaching Hospital, Lagos, Nigeria between January 2014 and December 2019. The cases were traced using clinic, ward and theatre records. The clinical and operative details of these patients were retrieved and analysed. Clinical information extracted included patients' demography, clinical presentations, diagnosis, procedures performed, complications and the immediate treatment outcome. Data were analysed using SPSS for Mac Version 25.0. Results were displayed in simple proportions using tables and charts.

Results: A total of 87 patients' records were available for review. Age range was 15–76 years with a mean and median age of 49.415 and 52 years respectively. Majority, 73(83.9%) of the patients presented with at least one symptom, whereas 14(17.7%) were asymptomatic. Loin pain was the commonest presentation in 72(82.8%). Indication for nephrectomy were benign in 28(32.2%) and malignant in 59(67.8%) patients. Overall, renal cell carcinoma was the most common indication for nephrectomy accounting for 59.8% of all nephrectomies. A total of thirty-one morbidities occurred in sixteen patients with a complication rate of 18.4% while transfusion rate was 40.2%. Reoperation and mortality rates were 2.3 and 3.4% respectively.

Conclusion: Malignant renal tumors are predominant indications for nephrectomy in our institution. Though associated with a high transfusion rate, open nephrectomy remains a safe procedure with a good short-term outcome.

Keywords: Nephrectomy; Indications; Complications.

Introduction

Nephrectomy is one of the most frequently performed operations on the kidney. This is often necessary for several renal pathologies requiring surgical extirpation of the tumour with part or whole of the affected kidney for relief of symptoms or treatment of underlying diseases. While some renal surgical disease conditions are amenable to

conservative or non-surgical treatments, there is however, no alternative to surgical intervention in others like malignant renal tumours where offering of surgical excision of the tumour-bearing kidney

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is the only chance of cure for affected patients.

Depending on the disease condition, partial, total or radical removal of the kidney may be indicated. Unlike in the past where all renal malignancies are treated by radical nephrectomy, renal conservative techniques are being currently advocated for carefully selected patients who fulfill the criteria. Partial nephrectomy otherwise known as nephron-sparing nephrectomy is indicated for small tumours and the main advantages in preservation of parenchyma and hence renal function, particularly in complex patients such as those with an anatomical or functional solitary kidney. Total or radical nephrectomy of one kidney can be undertaken in bigger lesions when the other kidney is functionally good. Radical nephrectomy which involves removal of the kidney within the Gerota's fascia with or without removal of the ipsilateral adrenal gland is indicated in malignant conditions of the kidney.

Techniques for nephrectomy have changed significantly in the last two decades as more nephrectomies are being carried out by laparoscopic approach. More recently, robotic assisted laparoscopic surgery is increasingly being utilized for nephrectomies than before and is the standard technique for nephrectomy in developed world because it offers great advantage in term of smaller wounds and quicker recovery amongst other advantages. However, open approach remains the main technique in our part of the world. Minimal access approaches may also not be appropriate for most of the patients in our environment because of late presentation. In the West, more than 70% of RCC are diagnosed incidentally. In Nigeria, incidental diagnosis is less than 10% and patients tend to present with huge masses.

Like other major surgeries, complications are not uncommon during and following nephrectomies. Factors that determine occurrence of complications include the indication for surgery as well as the extent of pathology necessitating kidney removal and size of the lesion and or the affected kidney. This study aimed to review the various presentations, clinical and pathological diagnoses, surgical treatments, short-term complications and mortalities of all patients who had nephrectomy in

the urology unit of our centre over a five-year period.

Patients and Methods

This was a five-year retrospective review of all patients who had any type of nephrectomy in the urology unit of the Lagos University Teaching Hospital, Lagos, Nigeria. The study period covered January 2014 to December 2019. The patients were referred from various private and general hospitals. The cases were traced using clinic, ward and theatre medical records. The clinical and operative details of these patients were retrieved and analysed. Clinical information extracted from the records included patients' demography such as age, sex and occupation, presenting complaints, clinical and computed tomographic or radiological diagnosis and sidedness of the lesion. The indications for nephrectomy were grouped into benign and malignant indications. Other clinical data retrieved were surgical incisions, procedures performed, intra-operative complications, post-operative management, short-term outcome of treatment and histology of resected specimens. Data was analysed using Statistical Package for the Social Sciences for Mac Version 25.0 (IBM Armonk, NY, USA). Results were displayed in simple proportions using tables and charts.

Results

During the study period, a total of 98 nephrectomies took place in our institution but only 87 patients had complete data for review. The age range of these patients was 15–76 years with a mean and median age of 49.415 and 52 years respectively. Majority of the patients were in their fifth, sixth and seventh decades of life. Forty-three patients were males while 44 were females with male to female ratio of 1:1 (Figure 1).

The patients had varying clinical presentations. Majority, 75 (86.2%) of the patients in this series presented with at least one symptom, whereas 14 (17.7%) patients were without any symptom. These asymptomatic patients had their renal pathologies diagnosed incidentally on imaging study of the kidneys carried out during routine abdomino pelvic scan or computerized tomography carried out for evaluation of other abdominal complaints. Loin or flank pain was the most common presentation in 72 (82.8%) patients which represented 98.6% of the

symptomatic group followed by loin swelling, 41(47.1%) and haematuria, 32(36.8%). The triad of haematuria, loin pain and loin swelling were found in 17(19.5%). About a quarter of our patients reported with features of advanced malignancies like weight loss and chronic anaemia (Figure 2).

Following clinical and radiological evaluations of these patients, indications for nephrectomy were benign and malignant in 28(32.2%) and 59(67.8%) respectively. Mean age of patients who had nephrectomy for malignant and benign indications were 56.1 and 36.7 years respectively ($p < 0.05$). Overall, RCC was the most common indication for nephrectomy accounting for 59.8% of all nephrectomies and 88.1% of malignant indications. For benign conditions, non-functioning hydronephrotic kidney was the most common indication in 13 cases which represents 14.9% of all nephrectomies but 46.4% of all benign indications (Table 1).

Radical nephrectomy was the most commonly performed operation in 54(62.1%) while radical nephroureterectomy was least commonly performed procedures in just 2(2.3%) patients. Splenectomy and distal pancreatectomy were performed in addition to radical nephrectomy in one patient and right hemicolectomy with intestinal anastomosis in another patient for obvious tumour involvement. Three patients had partial nephrectomy of which one had active wound drain from urine leakage that eventually stopped about 4 weeks after surgery. Anterior subcostal incision was used for most nephrectomies in 62(71.3%), followed by flank incision, 15(17.2%) and mid-line incision, 8(9.2%) cases. A patient had right paramedian incision while another one(1) had two incisions (flank and Gibson's incisions) for radical nephroureterectomy. Table 2 shows the types of nephrectomies offered to patients and sidedness of the lesions.

Following nephrectomy, histological analysis of resected specimens showed 58(66.7%) malignant and 29(33.3%) benign pathologies (Figure 3). Majority, 55(63.2%) were RCC including 52 suspected to be RCC after clinical and radiological evaluation and three with Bosniac type 4 cysts. One

large Bosniac 4 cysts was finally reported as benign and the only suspected case of angiomyolipoma was confirmed by histology to be malignant epithelioid angiomyolipoma. Of the RCC, clear cell was the most prevalent sub-type in 41 (74.5%) followed by papillary RCC in 12(21.8%). The least common histological sub-type was chromophobe variant in 2(3.6%) patients.

In this study, a total of thirty-one complications occurred in sixteen patients in either intra-operative or post-operative period with a complication rate of 18.4%. There were 7(8.0%) haemorrhagic and 24(27.6%) non-haemorrhagic complications. A total of 35(40.2%) patients received at least one unit of blood transfusion with a range of 1 to 10 and mean of 2.3 units. Majority, 32(91.4%) of the patients who were transfused had malignancy. Table 3 shows the details of complications.

Altogether, there were three peri-operative deaths with mortality rate of 3.4%; one intraoperative and two post-operative deaths. The intra-operative death was from massive intra-operative blood loss in a patient with advanced RCC with vascular involvement. One post-operative death was due to reactionary haemorrhage which required re-operation a day after surgery but patient eventually died and the other was from inadvertent ligation of superior mesenteric artery in a patient with advanced massive RCC who died five days post-operatively.

There were two(2.3%) re-operations; one for reactionary haemorrhage a day after radical nephrectomy and another for peri-renal collection with resultant retroperitoneal abscess about five weeks after the primary surgery. The former died while the latter survived. The range of duration of admission for nephrectomy was 5 to 32 days with an average of 10 days. Table 4 shows the complications versus nature of pathology that necessitated nephrectomy in these patients.

Table 1: Indications for nephrectomy

Indication for nephrectomy	Frequency (%)
Benign:	
Non/poorly-functioning hydronephrotic kidney	13 (14.9)
Major Renal trauma (Grade 4 and 5)	7 (8.0)
Large symptomatic benign renal mass	3 (3.4)
Non-functioning pyelonephritic kidney	2 (2.3)
Large symptomatic renal cystic disease	2 (2.3)
Renal Artery Stenosis with Secondary hypertension	1 (1.1)
Malignant :	
Renal cell carcinoma	52(59.8)
Bosniac 4 renal cysts (Malignant renal cysts)	4(4.6)
Transitional cell carcinoma	2(2.3)
Angiomyolipoma with malignant transformation	1 (1.1)

Table 2: Type of nephrectomy performed

Type of Surgery performed	Right n (%)	Left n (%)	Total n (%)
Simple Nephrectomy	15(17.2)	13(14.9)	28(32.2)
Radical Nephrectomy	25(28.7)	29(33.3)	54(62.1)
Nephron-sparing Nephrectomy	1(1.1)	2(2.3)	3(3.4)
Radical Nephro-ureterectomy	2(2.3)	0(0.0)	2(2.3)
Total	42(48.3)	45(51.7)	87(100.0)

Table 3: Complications of nephrectomy

Complication	Frequency(%)
Haemorrhagic:	
Primary haemorrhage	4 (4.6)
Reactionary haemorrhage	3 (3.4)
Non-haemorrhagic:	
Surgical Site Infection	10 (11.5)
Ileus	4 (4.6)
Sepsis	3 (3.4)
Pneumonia	2 (2.3)
Retropertoneal collection/abscess	1 (1.1)
Prolonged urine leakage	1 (1.1)
Others	3 (3.4)

Table 4: Morbidity/mortality versus nature of pathology

Complication	Benign n (%)	Malignant n (%)	Total n (%)
Haemorrhagic complications	0 (0.0)	7 (8.0)	7 (8.0)
Non-haemorrhagic complications	3 (3.4)	15 (17.2)	18 (20.7)
Re-operation	0 (0.0)	2 (2.3)	2 (2.3)
Mortality	0 (0.0)	4 (4.6)	4(4.6)

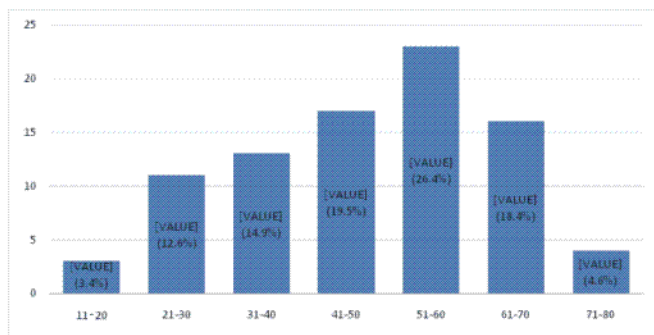


Figure 1: Age distribution of patients

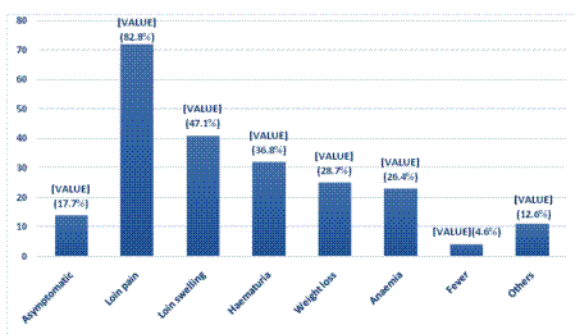


Figure 2: Clinical presentations of patients who had nephrectomy

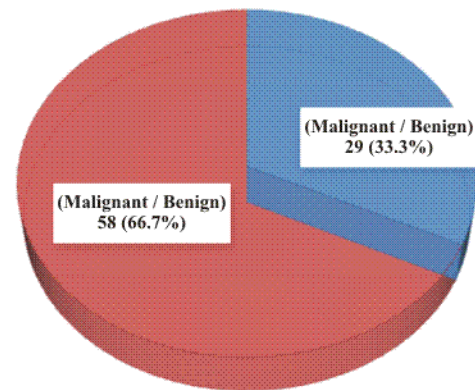


Figure 3: Histology of nephrectomy specimens

Discussion

Nephrectomy is a common procedure in urological practice. It is offered as treatment for a wide range of malignant and benign diseases of the upper urinary tract including those of the kidneys as well as sequelae of diseases of other parts of the urinary tract like ureter and pelvi-ureteric junction with resultant significant damage to kidney function. Radical nephrectomy, with or without ureterectomy, is the standard therapeutic urological procedure for malignancies of the kidney while simple nephrectomy is indicated for damaged kidneys with little or no contribution to the overall renal function.

The mean age of the patients who had nephrectomy in our study was 49.15.3 years. This is similar to other reports in West Africa. The higher mean age in some other studies was because their study population comprised of patients with malignant conditions only unlike ours which included patients with both benign and malignant kidney diseases. The mean age of 56.118.4 years for patients who had nephrectomy for malignancy was significantly higher than for those who had nephrectomy for benign conditions, 36.710.8 years ($p < 0.05$). The higher age in the malignant group conforms to known fact that renal malignancies are commoner in older patients and are most common from the sixth decade of life.

In our series, there was almost equal distribution among patients who underwent nephrectomy for both benign and malignant conditions with male to female ratio of 1:1. An earlier study in our centre documented a female preponderance. We found this

to be at variance with other reports locally and internationally. Interestingly, majority of the other studies showed a male preponderance. Whether our finding depicts a changing trend in prevalence as per gender or not, a higher study population and multi-centre, multi-racial international study will be necessary to validate this finding.

Overall, there were more malignant than benign conditions necessitating nephrectomy as 67.8% were performed for malignant conditions of the kidney. This conforms to reports from other studies in Nigeria, Africa and across the globe. This may partly be due to advances in radiological imaging techniques and availability of these techniques in our practice nowadays leading to increased diagnosis of renal tumours at earlier asymptomatic stage with attendant earlier nephrectomies and improved survival. Expectedly, renal cell carcinoma (RCC) is the most common malignancy in 52(59.8%) of all cases. In this series, nephrectomies were performed for two patients with non-functioning pyelonephritic kidneys and both were females. The higher rate of nephrectomies for infected kidneys in females is not surprising as females are generally more prone to urinary tract infections than males. This conforms with recent documented changing trend in indications for nephrectomies. Other benign and malignant conditions are almost equally distributed between males and females.

Majority of our patients were symptomatic with the most common symptoms being loin pain, loin swelling and painless total haematuria. This order of frequency of symptoms is similar to reports from other parts of the world and confirmed the characteristic triad of presentation pathognomonic of RCC as majority of patients in this study had nephrectomy for malignancy. The high proportion of symptomatic cases in the country reflects late presentation as advanced disease in our practice. The frequency of asymptomatic cases has however increased significantly from previous reports reflecting the increasing use of radiological tools especially computerized tomography scan in diagnosing renal tumours nowadays.

The diagnosis of renal masses is both clinical and radiological. This accuracy of radiological

diagnosis compared with final histological diagnosis after surgery was excellent. Our clinico-radiologic diagnosis largely corresponds to the final histological diagnosis after nephrectomy in all but one patient who was thought to have a malignant cystic lesion but turned out to have benign histology. Nephrectomy was actually indicated in this patient because of symptom and relatively big size of the lesion. This corroborates the fact that biopsy of suspected malignant renal mass is not mandatory after appropriate radiologic evaluation.

Radical nephrectomy is the commonest procedure carried out reflecting the predominance of RCC lesion in this series. Nephron-sparing nephrectomy was carried out in three patients. This is possibly because of the strict criteria for this procedure including the size of lesion <4cm. Most of our patients had lesions by far greater than 4cm and therefore had radical nephrectomy. Radical nephroureterectomy, which is the standard treatment for transitional cell carcinoma (TCC) of the kidney was performed in two patients lending credence to the predominance of RCC in malignant kidney disease. Sometimes it becomes necessary to carry out other procedures during radical nephrectomy. This is usually determined by the intra-operative findings. We had to do distal pancreatectomy as well as splenectomy in one patient while another required right hemicolectomy due to obvious tumour involvement. Fortunately, the second patient had limited bowel preparation that made primary anastomosis possible. Adequate pre-operative evaluation of the patient close to the time of surgery will help in adequate preparation of this patient.

The most common incision employed for nephrectomy in our study was the anterior subcostal transperitoneal approach. This is because most of renal masses in this series were malignant and patients usually present late with larger tumours that may be too large for flank approach. The principal advantage of the abdominal approach is that exposure in the area of the renal pedicle is excellent and it also offers opportunity to assess other intra-abdominal organs for metastasis. The principal disadvantage is the somewhat longer period of postoperative ileus which occurred in four of our patients.

For nephrectomy, the standard practice is to ligate the renal artery before the vein whenever possible. This however appeared difficult or sometimes impossible when dealing with huge tumours which we frequently encounter in our practice. For most of these advanced cases, it was easier for us to ligate the veins first and we have not found any adverse effect of doing this in difficult cases. We also did not experience the so-called dangerous swelling of the kidney. Likewise, the so-called arterio-venous fistula feared in mass ligation of the pedicles in difficult cases has been absent in our series as we are yet to record any case of such in the last two decades. There is a slight preponderance of the tumours on the left side in our study, 42 on the right and 45 on the left. While this agrees with the finding of some studies, it is also at variance with some reports. While this may be due to a small sample size but there appears to be nothing in the kidney that predisposes one side to having cancer than the other. Nephrectomy has to be regarded as a major surgical procedure with a consistent risk of complications, reoperations and postoperative mortality. The overall mortality in this series was 3.4% and there were more non-haemorrhagic than non-haemorrhagic complications as documented in other series. Transfusion rate of 40.2% is higher in this study than the figure of 18.1% reported in a study by Vricella et al. This may not be unconnected with the higher proportion of malignant indications and the fact that patients present late with advanced large volume disease with higher transfusion disease in our region because of combination of factors like ignorance, poverty with out-of-pocket healthcare financing and poor healthcare-seeking attitude which is not peculiar to renal malignancy. Generally, there were more complications amongst patients with malignant kidney diseases than those with benign lesions but more importantly all bleeding complications occurred in this group. Malignant kidneys are usually more vascularized because of neo-vascularization and tendency to invade the hilar blood vessels. In addition, almost all patients who required blood transfusion were from the malignant group.

One of the three patients who had partial nephrectomy had prolonged urine leakage while another had 3 units of blood transfused for excessive blood loss. This is not surprising as partial

nephrectomy is a technically challenging procedure with potentially high complication rate even in expert hands.

The overall re-operation rate in our study was 2.3%. This is similar to another report by Ballesteros Sampol et al. Bleeding complication is the most common reason for re-operation usually due to reactive haemorrhage in the immediate post-operative period as seen in one of the 2 cases. Retroperitoneal blood collection leading to retroperitoneal abscess seen in this study is also related to either bleeding from the operative bed due to inadequate haemostasis or inadequate drain function. Again, all re-operation took place amongst patients with malignancy.

The mortality rate of 3.4% is higher than reported in other studies in developed countries. This may be due to higher proportion of RCC in our series. The 3 mortalities occurred amongst patients with malignancy. More importantly, late presentation of patients with malignancy is a common problem in our environment making surgery more difficult posed by sheer size of kidney, neo-vascularization and vascular invasion.

Conclusion

This study shows that the triad of loin pain, loin swelling and haematuria is still the commonest presentation of patients with surgical renal disease in our practice. Advanced radiological tools have enabled excellent pre-operative and early diagnosis of renal masses. This study also demonstrated that nephrectomy is a safe procedure and complications resulting from the procedure depends on factors such as indication for surgery. Nephrectomy for malignancy is associated with higher complication and re-operation rates than simple nephrectomy.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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