ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCE AND SCHOOL OF MEDICINE DEPARTMENT OF PATHOLOGY

Histopathologic patterns of neoplastic and non-neoplastic kidney lesions in nephretcomy specimen in Tikur Anbesa Specialized Hospital, Addis Abeba, Ethiopia, over a five year period, 2017-2021

For Partial fulfillment of the requirements for the Specialty Diploma in Pathology

Investigator -Kasahun Wolde (MD, Final Year Pathology Resident)

Advisor –Dr Tufa Gemechu (MD, Associate professor of pathology)

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List of Acronyms and Abbreviations

AAU:	Addis Ababa University
TASH:	Tikur Anbesa Specialized Hospital
RCC:	Renal cell carcinoma
TB:	Tuberculosis
CPN:	Chronic pyelonephritris
XGP:	Xanthogranulomatous pyelonephritis
KSCC:	keratinizing squamous cell carcinoma
HN:	Hydronephrosis
ccRCC:	Clear cell renal cell carcinoma
CGN:	Chronic glomerulonephritis
AML:	Angiomyolipoma
NEK:	Non-excreting kidney

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Abstract

Background

The kidney is one of the major organs that have essential functions such as maintaining electrolyte balance and ph as well removing waste products among other things. Various neoplastic and non-neoplastic lesions affect the kidneys for which nephrectomy are the standard procedure performed. The indications, however, differ by geographic location , age groups and time periods .Therefore ,the aim of this study is to determine the patterns of neoplastic and non-neoplastic lesions in nephrectomy specimens in TASH.

Methods and Materials

This was a retrospective cross sectional descriptive study conducted on 174 patients having Histopathologic evaluation of their nephrectomy specimens at Tikur Anbesa Specialized Hospital from September 2017 and August 2021.

Result

92 (52.9%) of the study subjects were females while remaining 82(47.1%) were male with male to female ratio of 0.9;1 . Neoplastic diseases accounted for 75.2 percent, nonneoplastic 22.4 and multicystic renal dysplasia 2.3 percent . The mean age of patients was 31.95 with SD 22.127 with minimum and maximum age of 6 month and 75 years respectively. The most common neoplatsic indication for nephrectomy was renal cell carcinoma [N=69] constituting 39.7 percent followed by nephroblastoma 26.4 percent [N=46]. The most common non-neoplastic lesion was CPN with HN accounting for 35.5 percent.

Conclusion

A wide Histopathologic spectrum of neoplastic and non-neoplastic diseases were found in the present study. There is a decline in non-neoplastic lesions which may be due to early diagnosis and treatment.

Keywords: Non-Neoplastic lesions, Neoplastic lesions, nephrectomy

1. Introduction

1.1 Background:

The kidneys are reddish, bean-shaped organs located on each side of the vertebral column in the retroperitoneum, extending from 12^{th} thoracic to 3^{rd} lumbar vertebrae with the right positioned lower than the left [1] . On the upper pole of the kidneys are located the adrenal glands. On the medial portion where vessels, nerves and renal pelvis are located is called hilum. The kidney is covered by connective tissue capsule. Cut surface of fresh kidney shows cortex and medulla, the outer reddish brown and the much lighter inner part respectively. Each kidney is composed of 11 to 14 lobes and each lobe consists of medullary rays and surrounding renal parenchyma [2].

The cortex is characterized by the renal corpuscles and their associated tubules. The nephron is the functional unit of the kidney. 400 t0 500 medullary rays project from cortex to medulla. Each medullary ray is aggregate of straight tubules and collecting ducts [2].

Kidneys are one of the major organs of the human body that serve several essential functions .Their main function is to maintain the balance of electrolytes in the blood and PH . They also remove waste product of metabolism. They produce erythropoietin to maintain hematopoiesis and the enzyme rennin which is important in regulating blood pressure [3].

A wide array of renal diseases employs nephrectomy as a common procedure for both benign and malignant conditions. Different geographical regions and institutions display distinct causes of nepherectomy. Hence, nepherectomy specimens are analyzed histopathologically and only then treatment guidelines specified particular to the geographic area [5].

There are three types of nephrectomies. These include: simple nepherectomy, partial nephrectomy and radical nepherectomy. Simple nephrectomy specimens consist of a kidney with variable amount of attached perinephric fat and a length of ureter. A Partial nephrectomy specimen consists of a tumor that has been enucleated, or is excised with a variable amount of surrounding renal tissue, with or without attached perinephric fat. Part of the pelvicalyceal system may also be included. A radical nepherectomy includes the kidney and perinephric fat with surrounding Gerota's fascia, a length of ureter with or without adrenal gland [10].

Kidneys are affected by various neoplastic and non-neoplastic pathologic processes. Common clinical conditions involving the kidney include nephrotic and nephritic syndrome, acute kidney injury, chronic kidney disease, urinary tract infections, nephrolithiasis, renal cyst and various cancers of the kidney [3].

Malignant neoplasms of the kidney are of great importance clinically, the most common of which, is renal cancer followed by wilms tumor which is found in children. Finally, urothelial carcinoma of the calyces and pelvis. Metastatic carcinomas can affect the kidney but is rarely clinically significant. The most common primary sites are the lung, skin (malignant melanoma), breast gastrointestinal, pancreas, ovary, testis (nonseminomatous germ cell tumors particularly choriocarcinomas). Sarcomas can arise in the kidney, including leiomyosarcoma, synovial sarcoma, and pleomorphic rhabdomyosarcoma. However, sarcomatoid RCC, (or urothelial carcinoma) and primary retroperitoneal soft tissue sarcoma (particularly de-differentiated liposarcoma) with secondary renal invasion should be considered.

Renal cell carcinoma is a group of malignancies arising from the renal tubules. Renal cell carcinoma (RCC) represents on average 90% of all malignancies of the kidney that occur in adults in both sexes. Overall it is the 12^{th} most common site in men and the 17^{th} in women [15].

1.2 Statement of the Problem

The most common indication for nephrectomy in the west is renal cell carcinoma, whereas, in developing countries non-neoplastic conditions like chronic pyelonephritis with hydronephrosis take the lion's share [7].

In Ethiopia, Lack of health facilities and lack of awareness of the disease contribute to late presentation of patients with irreparably damaged kidneys necessitating surgical removal of the kidney and significant morbidity and mortality [7].

According to the Globocan report on the incidence and prevalence of cancer in Ethiopia by 2020, 77,352 new cases and 51,865 deaths occurred due to cancer with renal cancer ranking 12thwith 2418 new cases and 1387 deaths, respectively [14].

There is global variation in the incidence of renal masses with developed nations having a greater incidence. About 80 to 90 % of renal malignancies are renal cell carcinomas which account 2-4% of all a cancers. In Africa and the Middle East, the age –standardized incidence for RCC is 1.8-4.8 / 100,000 for males and 1.2-2.2/100,000 for females [16]

The incidence of renal malignancy has increased over the recent decades in the context of the more widespread use of diagnostic imaging. [15]

Cigarette smoking, excess body weight and uncontrolled blood pressure are important modifiable risk factors for renal cell carcinoma with high prevalence in the general population. [15]

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1.3 Rationale of the Study

There are variations in the prevalence of neoplastic and nonneoplastic conditions in nephrectomy specimens with geographic location, age of patient throughout the world. Studies from transitioning countries show that non-neoplastic conditions are the most common indications for nephrectomy whereas in developed countries malignancies particularly renal cell carcinoma is the leading cause of nephrectomy. Since there is a limited information in the literature in Ethiopia on the frequency and distribution of neoplastic and nonneoplastic conditions in resected kidney specimens, the objective of this study is to determine the prevalence of neoplastic and nonneoplastic lesions necessitating nephrectomy procedures in Tikur Anbessa Specialized Hospital from September 2017 to August 2020 using the 2004 WHO classification of Tumors of the Urinary system and Male Genital Organs.

2. Literature Review

Numerous studies have been done all over the world on the prevalence of different kidney lesions in nephrectomy specimens. Of these, a 12 year retrospective study done in India at the UP University of Medical sciences by Mani K., Pratibha I, et al [4] , on 111 nephrectomy cases is found . In this study, there were 70 non-neoplastic lesions and 41 neoplastic lesions with the most common non-neoplastic being chronic pyelonephritis 42.86 % (n= 30) and Renal cell carcinoma was the most common neoplastic lesion 68.29 % (n=28) . 1 case o f SCC(2.44%),1 metastatic adenocarcinoma , 1 Angiomyolipoma (2.44% each) were found . Males constituted 59% (51.35) cases and females 42% (49.65 cases) with M:F ratio of 1.13: 1. From the non-neoplastic 70 lesions , 30 (42.86%) cases were chronic pyelonephritis ,6 chronic pyelonephritis with stone(8.57%) ,9 chronic pyelonephritis with hyderonephrosis (12.86) ,4 xanthogranulomatous pyelonephritis(5.71%), 3 Chronic Glomeluronephritis (4.28%), 3 Tuberculous Pyelonephritis (2.86%), 1O cysts (14.28%), 4 lacerated injury (5.71%),1 atrophy (1.43%), 1 infarction with Fat necrosis (1.43%). From the neoplastic lesions , there was 1 case of metastatic adenocarcinoma (2.44) , 68.29 % RCC(n=28), wilm's tumor14.63 %(n=^), 1 Squamous Cell carcinoma (well differerentiated) 2.44% , 2 cystic nephroma (4.88%), congenital mesoblastic nephroma 4.88%(n=2), 1 Angiomyolipoma (2.44%).

A five year crossectional study of pattern of Histopathological Lesions in Nephrectomy Cases in Southern Rajasthan done between Jan 2015 to Mar 2020 by Gulshan K., Geeta W., Manisha J., Upasana B., Mohan L. et al [5] on a total of 121 nephrectomy cases , 88 (72.7%) were non-neoplastic and 33 (22.27%) were neoplastic . Out of the 88 cases ,38 cases(43.1%) were Chronic pyelonephritis with nephrolithiasis and hydronephrosis ;12 (13.6%) were Chronic pyelonephritis with nephrolithiasis ; 18 (20.4%) had chronic pyelonephritis with hydronephrosis ; 11CPN (12.5%), 2 cases of cystic lesion . 1 case of hydronephrosis , 1 xanthogranulomatous pyelonephritis with nephrolithiasis and 1 case of traumatic kidney accounting 2.27% each. 2 cases of chronic pyelonephritis with pyonephrosis (2.27), 2 cases of chronic pyelonephritis with granulomatous change ,2 cystic lesion .

Another retrospective study done in Raipur City India by Ajay S., Renuka G., Bimla B. et al [6] from Jan 2013 up to Sep 2018 on 54 nephrectomy specimens collected at the Department of Pathology shows 16(29.6%) cases were non-neoplastic and 38(70.4%) were neoplastic with 57. 4

% male and 42.6% female and M:F ratio of 1.3:1. Among the non-neoplastic 16 cases , 7(13%) were CPN with hydronephrosis , 4 cases of abscesses (3.7%) . 1 case of hydronephrosis , 1 case of xanthogranulomatous pyelonephritis , 1 case of polycystic kidney disease each accounting 1.9%. From the neoplastic 38 cases, 20(37%) were Renal Cell Carcinoma, 16(29.6%) were cases of wilms tumor, 1 case of SCC of renal pelvis.

Maximum cases of chronic pyelonephritis were seen in age group 31 to 40 years. Majority of Renal Cell Carcinoma were seen in patients between 31 to 60 years of age , while Wilms tumor was mainly seen in patients less than 10 years of age . Highest number of patients belong to 0 to 10 years with 33.3 % (18 cases) followed by those in age group between 31 to 40 with 22.2%.

Among the 20 cases of RCC, 9 (45%) clear cell carcinoma was the most frequent followed by papillary RCC 6 cases (30%). Other tumors included 1 case each of (5%) medullary carcinoma, collecting duct carcinoma, chromophobe RCC. 2 cases of undifferentiated carcinoma (10%). In this study, there is a decrease in the number of nephrectomies done for non-neoplastic disease due to availability of antibiotics and minimally invasive techniques to remove renal stone [6].

A retrospective study to determine Indications, Complication and mortality of nephrectomy at Tikur Anbessa Specialized hospital on medical records of 73 patient who underwent nepherectomy in this Hospital, urology unit from Sep 2009 up to Aug 2011 done by D. Andualem , B. Teklebirhan , C. Wuletawu et al .[7] shows 40 (54.58%) male and 33 (45.2%) were female with M :F ratio 1.2: 1.. In this study , the most common presenting complaint is loin pain found in 100 % of patients followed by hematuria 32 patients (43.5) ,abdominal or flank mass 35.6% of cases . Among the patients who underwent nephrectomy 38 (51.2%) had none or poor functioning kidneys due to obstructive uropathy. There were 2(2.1] , 3(4.1%) and 1(1.4%) cases of pyonephrosis, renal tuberculosis, and benign renal mass as indications for nepherectomy, respectively. Out of 73 nepherectomy cases, benign conditions accounted for 46 (63%) and 37 % had malignant disease. All the 27 (37%) malignant tumors had indications for nephrectomy had a CT scan imaging suggestive of malignant mass. Of all patients who underwent nepherectomy for malignant condition, 16 (59.3) patients presented with a triad clinical manifestation of loin pain, hematuria, loin or abdominal mass. The mean age of patients who underwent nephrectomy for benign disease was 40 years (ranges from 15 to 65) and the

mean age of patients who underwent of nepherectomy for malignant disease was 50.5 years ranges from 26 to 75 years). 30 patients operated for non –functioning kidney had demonstrable lack of excretion on Intravenous pyelography (14 on the right side and 16 on the left side). 8 patients had nephrectomy with ultrasound result , all suggestive of severe hyderonephrosis due obstructive uropathy. Only three cases had nephrectomy in this study due to trauma. This study didn't show a decrease in the number of nephrectomies done for non-traumatic disease despite availability of antibiotics and minimally invasive urologic procedures to deal with renal stones [7].

A retrospective study at Lagos University Teaching Hospital of medical records of 64 adult patients with confirmed or suspected renal cell carcinoma done by K.H. Jijani, C.C Anounbi, E.U. Ezenwa, A. Lawal, M.Y.M Habeebu, E.A. Jeje, M.A. Ogunkimi, M.O. Afolaytan [8] between January 2000 and December 2010 shows mean age of patients 41.8 (range from 20 to 75) ,with peak age being 5th decade followed by 3rd decade . M: F ratio of 1:1.7. Only 1(1.6%) patient had family history of malignant renal tumor (mother). 3(4.7%) had exposure to industrial dye. 7 (11%) had history of tobacco use for at least three years. Hematuria 26(40.8%), loin pain 55(86%) ,flank mass 23(36%). 1 patient was asymptomatic and was incidentally diagnosed . Tumors located on left side in 28 (43.8%) and right side in 31 (48.4%) and 5 (7.8%) had bilateral tumor. There was history of weight loss in 35 patients (54.7%) and 15 (23%) were febrile at presentation. Anemia in 42.3%, night sweats in 7.7%, pedal edema in 10(15.6%) and 2 of 24 male patients (8.3%) had an irreducible varicocele (one on the right and one on the left side).

In this study the diagnosis of RCC was made on clinical features and CT findings of a contrast enhancing solid renal mass in all patients. 45 (70.3%) had histological confirmed RCC from operative specimen of which clear cell carcinoma were 27(60%) , papillary 12(26.7 %) , 4 collecting duct carcinoma (8.9%) , 1(2.2%) case of sarcomatoid and 1(2.2%) case of chromophobe . Diagnosis was made on FNA in 11(17.2%) with clinically advanced and inoperable disease, and on clinical and radiological findings alone in 8(12.5%) patients with clinically advanced and inoperable tumor.

A retrospective study on ethnic variation of the histologic subtypes of renal cell carcinoma in Singapore done by E.V. Ezenwa , Y.H. Tan et al [10]over a ten year period(between 2001 and

2010) data obtained from the Cancer Registry Lagos teaching hospital's urology department on 676 patients(80.8 % Chinese, Malays 6.5% ,Indians 4.6%, other minor groups 8.1 %) show the mean age(SD) at presentation was 58.1(12), 57.6(10), 55.1(9.6) for the Chinese ,Indians and Malays respectively. The commonest histologic variant of renal cell carcinoma was clear cell carcinoma irrespective of age and sex. Clear cell carcinoma accounted for 79.7 % for Chinese, 70.5% for Malayans and 77.4 % for Indians seconded by papillary carcinoma(11.9%) in the Chinese population and papillary carcinoma in conjunction with unclassified subtypes in the Indians (9.8% each). For the Malays and other ethnic minorities in Singapore the unclassified subtype represented the second most common category.

A retrospective study on medical record of 154 patients who underwent nephrectomy during five year period between January 2001 and December 2005 by Muhammed Rafique , et al. [11] in Pakistan ,shows 118 (76.6%) and 36(23%) were done for benign and malignant conditions respectively. Renal stone accounted for majority (53.3%) of nephrectomies for benign condition followed by chronic pyelonephritis (20%) , neglected ureteropelvic obstruction (16%) , renal tuberculosis (7.6%) and iatrogenic (2.5%). Patients with benign condition were much younger than patients with malignant condition, with mean ages of 32 and 52.4 years respectively. Nepherectomy for malignant condition has higher rate of complication (13.8%) than for benign condition [7.6%). Mean age of patients with renal cell carcinoma was 52.8 years, which are younger compared to western countries. Male to female ratio of 1.5:1. Clear cell variety accounted for 97% of renal cell carcinoma. In this study, more female (37) underwent stone-related nepherectomy than male (24) .

In agreement with the preponderance of benign lesions as indications for nephrectomy ,is a five year retrospective study between November 1, 2005 and October 31 ,2010 on 140 nephrectomy specimens at the Department Of Pathology , Government Medical College by Aiffa A., Kuldeep S., Mir Y., et al [12].

Shows 68 cases (48.57%) were male and 72 cases female (51.43%) with M: F ratio of 0.94:1. Majority (77.2%) were benign and 22.8 % malignant. Maximum number of cases were Chronic Pyelonephritis (62.8 %) followed by renal cell carcinoma (22.8%). Highest number of chronic pyelonephritis fell in the age group between 21 to 40 years whereas maximum number of renal

cell carcinoma fell in the age group between 61 to 70. A greater percentage of benign lesions (87.5%) were observed in females while a greater percentage of malignant lesions (33%) were observed in males. 25 cases of renal cell carcinoma were seen , of which ,72% were male and 28% were female. Age of patients ranged between 40 to 80 with maximum incidence above 60 years. Majority of RCC were clear cell type accounting 80 %. Fuhrman nuclear grade 2 was seen in maximum number of cases (52%) and 8 % showed grade 2 nuclear features.

8 cases of xanthogranulomatous pyelonephritis most occurred between 40 to 60 years. 1 case Squamous cell carcinoma ,5 Wilms tumor ,1 Angiomyolipoma , 2 cystic renal disease ,2 traumatic kidney disease , 1 renal sarcoma were seen .

The preponderance of benign lesions in this study is comparable with similar findings in a study by Mohammad Rafique et al in Pakistan where benign and malignant lesions accounted for 76.6 and 23.4 % respectively.

Another a four –year retrospective prospective study on spectrum of diseases in 146 nephrectomy specimens in Saudi done by Ramakrishna R , Sridevi C ., et al.[13] between June 2014 and march 2018 shows 94 were male and 52 were female constituting 64.4% male and female 35.6% respectively with M:F ratio of 1.8:1. In this study, majorities [114]were non-neoplastic and 32 were neoplastic. Among the non-neoplastic condition the most common pathologic entity is chronic pyelonephritis followed by tuberculous pyelonephritis constituting 66 and 18 cases respectively. Among neoplastic conditions, renal cell carcinoma was the commonest followed by wilms tumor, transitional cell carcinoma, clear cell sarcoma and congenital mesoblastic nephroma. 19 were renal cell carcinoma cases, of which 8 were clear cell histologic type (63%) .

The age of youngest and oldest patient was 10 months and 76 years. The highest number of cases noted in the age group 36 -45 years and the lowest in the pediatric age group less than 5 years .87 kidneys removed were right side and 59 left sides.

The pathologic evaluation of tumor nepherectomy specimens focuses on the diagnosis, grading and staging of the neoplasm. However, the presence of coincidental nonneoplastic disease in these specimens may have significant impact on patient outcome. One study done regarding the

spectrum of nonneoplastic disease in tumor nephrectomy specimens by Henriskem K.,Mehan S., Chang A. et al [17], on 246 adult nephrecteomy specimens reveals 41 cases (16.7%) had alterations such as diffuse and /or nodular mesangial sclerosis , mesangial hypercellularity ,or glomerular basement membrane thickening . 19 cases had diabetic nephropathy, 1 atheroembolic disease ,3 thrombotic angiopathy, 1 sickle cell nephropathy , I case focal segmental sclerosis .

A retrospective study by Ajay K. et al in Bihar India on 49 nepherectomy specimens between April 2014 and march 2016 revealed 42 (85.71%) and 07 (14.29%) were nonneoplastic and neoplastic respectively similar to study by Shila et al [19]. 20 cases (40.82%) were males and 29 cases (59.18%) were female with M: F ratio of 1:1.4 which is comparable with the study by Aiffa Aiman et al 12] and Mohamed Rafiq [11].

Xanthogranulomatous pyelonephritis (XPG) is an uncommon form of destructive granulomatous inflammation of the renal parenchyma in association with long-term urinary tract obstruction and infection. It affects female more often than male, with a wide age range, from newborn to elderly (21). XGP is commonly misdiagnosed preoperatively because it mimics other pathologic conditions such as pyelonephritis, tuberculosis, perinephric abscess and RCC (21, 23). In one series, up to 42.3 % of cases had renal masses that were suggestive of RCC on computed tomography scan (22).

A retrospective review of 41 cases of xanthogranulomatous pyelonephritis by Fernando Korkes, Ricardo L , Marco B., et al showed XGP accounted for 19.2% of all nephrectomies performed for pyelonephritis during the study period with 85.4% and 14.6 women and men respectively . All patients were symptomatic, and the most common symptoms were fever, flank or abdominal pain, weight loss, lower urinary tract symptoms, and gross hematuria (20).

3. Objective of the study

3.1 General objective

- To determine the frequency and histopathology patterns of neoplastic and non-neoplastic lesions in nephrectomy specimens diagnosed at Tikur Anbessa Specialized Hospital , Addis Abeba Ethiopia, between 2017 to 2021

3.2 Specific objectives

- To describe the socio – demographic characteristics of patients with neoplastic and non-neoplastic kidney lesions.
- To show the prevalence and frequency of the neoplastic and non-neoplastic kidney lesions
- To show distribution of various neoplastic and non-neoplastic kidney lesion cases by age and gender
- To show the distribution of the clinical and image finding, the type of nephrectomy done and macroscopic finding among neoplastic and non-neoplastic kidney lesions.
- To show distribution of the various neoplastic and nonneoplastic kidney tumors by histopathologic pattern.
- To show frequency of distribution of the malignant kidney tumors with pathologic stage.

Methods and Materials

A retrospective cross-sectional descriptive review of requests and reports of histopathology evaluation of nephrectomy performed at Black Lion specialized teaching Hospital in Addis Ababa, Ethiopia in a five years period from September 2017 to August 2021.

All the hard copy of requests and reports of patients with kidney lesions whose nephrectomy specimens were submitted to TASH , Addis Abeba, Ethiopia during the study period reviewed from the archive of Pathology Department. Demographic data, clinical presentation of the patient, laterality and site of lesion, size and gross appearance of lesion as well as histopathology diagnoses were extracted using data extraction sheet including nuclear grade and stage when applicable.

Results

From a total of 181 patient cases reviewed, only 174 were having complete records suitable for the study for some patients data was retrieved from icare. The other 7 cases were excluded due to lack of age or sex data including and 1 needle biopsies and two were recurrent tumor in renal fossa at postnephrectomy site. Of the remaining 174 cases, 92 (52.9%) of the study subjects were females while remaining 82(47.1%) were male with male to female ratio of 0.9;1 [see table 2] . Neoplastic diseases accounted for 131 cases and non-neoplatsic 39 and 4 were multicystic dysplasia . Most nephrectomy n=51 [29.3 percent] were done in the age group 0 to 10 followed by the 4th to 5th decade [N=31] making up 17.8percent [see Table 1 and graph 1]. The mean age of patients was 31.95 with SD 22.127 with minimum and maximum age of 6 month and 75 years respectively. Of the 82 male who underwent nepherectomy there were a total of 54 malignant and 4 benign ; 21 nonneoplastic and 3multicystic dysplasia ; whereas in female ,there were 67 malignant , 6 benign and 18 nonneoplastic , 1 multicystic dysplasia .The most common neoplatsic indication for nephrectomy is renal cell carcinoma [N=69] constituting 39.7 percent followed by nephroblastoma 26.4 percent [N=46] .The most common RCC is clear cell RCC with[N=44] followed by chromophobe RCC [N=15] and 8 cases of papillary RCC. The mean age for clear cell, chromophobe and papillary RCC respectively were 49.09 , 48.67, 39.75 respectively. The minimum and maximum age for RCC is 19 and 75 yrs respectively with mean

age of 48 years .Out of the 69 RCC cases males and females constitute 35 [50.7 percent] and 34 [49.3 percent] cases respectively.

There was one case each of high grade invasive papillary urothelial carcinoma, malignant spindle cell tumor and seconderies of choriocarcinoma. 2 cases each of keratinizing SCC, 2 cases of RCC, unspecified

Of the 174 cases ,clinical datum were available ,including those for whom datum were retrieved from the patients icare number , for only 121 cases ,of which 48 patients presented with flank pain as the most common clinical presentation [27.6 percent] ; followed by abdominal mass n=20 [11.5 percent] . Hematuria and flank pain accounted for 19 cases [10.9 percent] . Only 1 patient presented with triad of flank pain, mass and hematuria [1.1 percent]. Four patients presented with percuataneous fistula with pus drain in the flank area [3.2 percent] . One patient [0.6 percent] 22 years old female presented with spontaneous rupture of kidney without anetecedent trauma and was diagnosed with seconadries of choriocarcinoma [See Fig 1 pie chart].

Out of the 48 [39.7 percent] patients who presented with only flank pain, neoplastic and non-neoplastic disease account for 27 [56.3 percent] and 21 [43.7 percent] respectively. This finding is comparable with a study by Muhamed Rafique in Pakistan which found flank pain in 38 percent of patients [11] . However this findings are variable with a study in TASH which found loin pain in 100 percentage of patients [7].

Of the patients who presented with abdominal mass 2 were non-neoplastic , 17 were malignant and 1 benign . All patients having hematuria [n=6] and flank mass [n=6] were with malignant disease. Of the 19 patients who presented with hematuria and flank pain 15 , 1 and 3 patients respectively have malignant , benign and non-neoplastic disease .

The imaging information after filling for some patients from their ICARE , was documented for only 65 patients [37.3 percent]. The site of lesion was mentioned for 37 cases [21.2 percent]. Out of the 65 imaging [22 were CT and 2 U/S ,1 MRI and the rest not specified]. 24 were documented as renal mass [33.8 percent], 10 NEK [14.9 percent] , 11 RCC [16.4 percent], 8 wilms tumor [5.2 percent] ;3 cases each having renal stone ,pyonephrosis , and hydronephrosis

[4.6 percent] [see fig 2 pie chart]. 4 renal cyst [6 percent], one of which was histologically clear cell RCC and the others simple cyst and chronic pyelonephritis. Out 0f the 22 imaging renal masses, all were malignant histologically. Of the 8 wilms tumor diagnosis made on imaging ,7 were retained histologically and one was malignant rhabdoid tumor of kidney histologically. Of the 10 cases of presumed RCC on imaging, 9 were RCC and 1 case turned out to be nephroblastoma. One case diagnosed as cystic RCC turned out to be clear cell RCC. One patient, 39 years old male, who had previous biopsy of cerebellar hemangioblastoma was diagnosed with VHL having on CT scan multiple bilateral cyst and multiple solid renal lesion [1.4 percent].

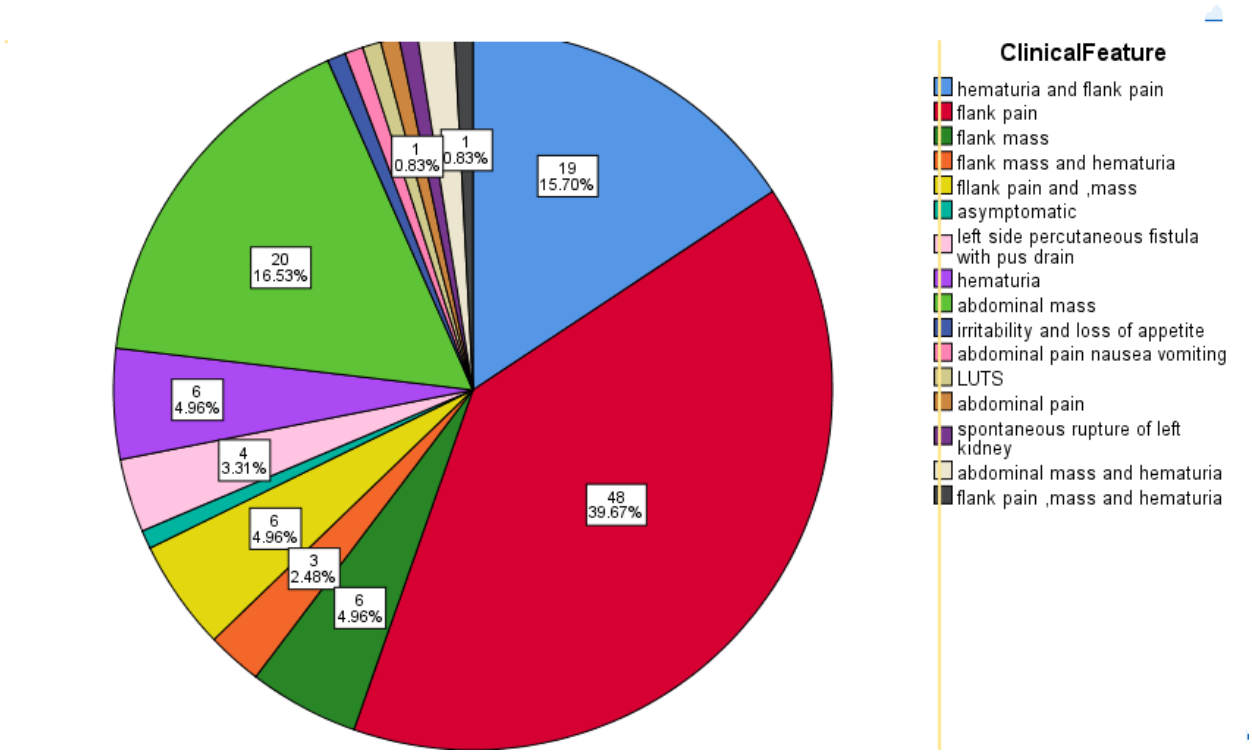


FIGURE 1: Pie chart showing the frequency and percentage of clinical features at TASH, Addis Abeba, Ethiopia from 2017 to 2021

Table 1. Histopathologic spectrum of neoplastic cases at TASH, Addis Abeba, Ethiopia from 2017 to 2021

Neoplastic	131	
Malignant tumors	121	
nephroblastoma	46	26.4
RCC	69	39.6
KSCC	2	1.14
High grade invasive urothelial carcinoma	1	0.6
Malignant spindle cell tumor	1	0.6
Malignant rhabdoid tumor of kidney	1	0.6
Seconderies of choriocarcinoma	1	0.6
Benign tumors	10	
Oncocytoma	2	1.1
AML	5	2.9
Benign spindle cell tumor	1	o.6
Simple cyst	1	0.6
Multicystic nephroma	1	0.6

Table 2. Histopathologic spectrum of non-neoplastic cases at TASH, Addis Abeba, Ethiopia from 2017 to 2021

Non-neoplastic	**number**	**percentage**
CPN with HN	16	9.2
CPN	5	2.9
CGN	3	1.7
Nephrolithiasis with CPN	3	1.7
Tuberculous abscess	2	1.1
CPN with HN and pyonephrosis	2	1.1
Hydronephrosis	2	1.1
Acute on chronic pyelonephritis	1	0.6
HN with XGP	1	0.6
XGP	1	0.6
Chronic pyelonephritis with features of ESRD	1	0.6
tuberculous pyelonephritis with simple cyst	1	0.6
multicystic dysplasia	4	2.3

TABLE 3: Age distribution of nephrectomy specimens at TASH, Addis Abeba, Ethiopia from 2017 to 2021

AGEGROUP	**Malignant**	**Benign**	**nonneoplastic**	**Multicystic dysplasia**	**total**	
Less than 10 years	47 [27 percent]	0	1 [0.6 percent]	3 [1.7 percent]	51	
11 to 20	1 [0,6]	o	6 [3.4]	o	7	
21 to 30	10 [5.7]	0	12 [6.9]	o	22	
31 to 40	12 [6.9]	4 [2.3]	6 [3.4]	1 [0.6]	23	
41 to 50	21 [12.1]	1 [0.6]	9 [5.2]	0	31	
51 to 60	22 [12.6]	1 [0.6]	5 [2.9]	0	28	
61 to 70	5 [2.9]	4 [2.3]	0	0	9	
Above 70	3 [1.7]	0	0	0	3	
TOTAL	121	10	39	4	174	

Table 4; Gender and age wise distribution of nephrectomy specimens at TASH, Addis Abeba, Ethiopia from 2017 to 2021

AGE GROUP	MALE	percent	FEMALE	percent	TOTAL	PRECENT
LESS than 10	20	11.5	31	17.8	51	29.3
11 to 20	4	2.3	3	1.7	7	4
21 to 30	9	5.2	13	7.5	22	12.6
31 to 40	12	6.9	11	6.3	23	13.2
41 to 50	17	9.8	14	8.0	31	17.8
51 to 60	14	8	14	8.0	28	16.1
61 to 70	4	2.3	5	2.9	9	5.2
Above 71	2	1.1	1	0.6	3	1.7

Out of the 10 NEK on imaging , 1 chronic glomerulonephritis, 4 CPN with hydronephrosis, 1 case of tuberculous abscess, 2 multicytsic dysplasia; 1 case of CPN,HN ,PN and 1 CPN ; 1 chronic obstructive pyelonephritis .

The laterality of the lesion known for 158 cases [90.8 percent] , of which 74 [42.5 percent] and 83 [47.7 percent] were on the left and right respectively with one case having bilateral location[0.6 percent].

Maximum number of CPN with hydronephrosis occurred on the right side [n=10] where as on the left only 4 cases occurred. All cases of nephrolithiasis with CPN [n=3] occurred on the left side. Overall, more malignant lesions on the right and more benign and non- neoplastic on the left [see table8]

laterality	Malignant	Benign	Non-neoplastic	cystic	Total
Right	56	2	15	1	74
left	52	8	20	3	83
bilateral	1				1

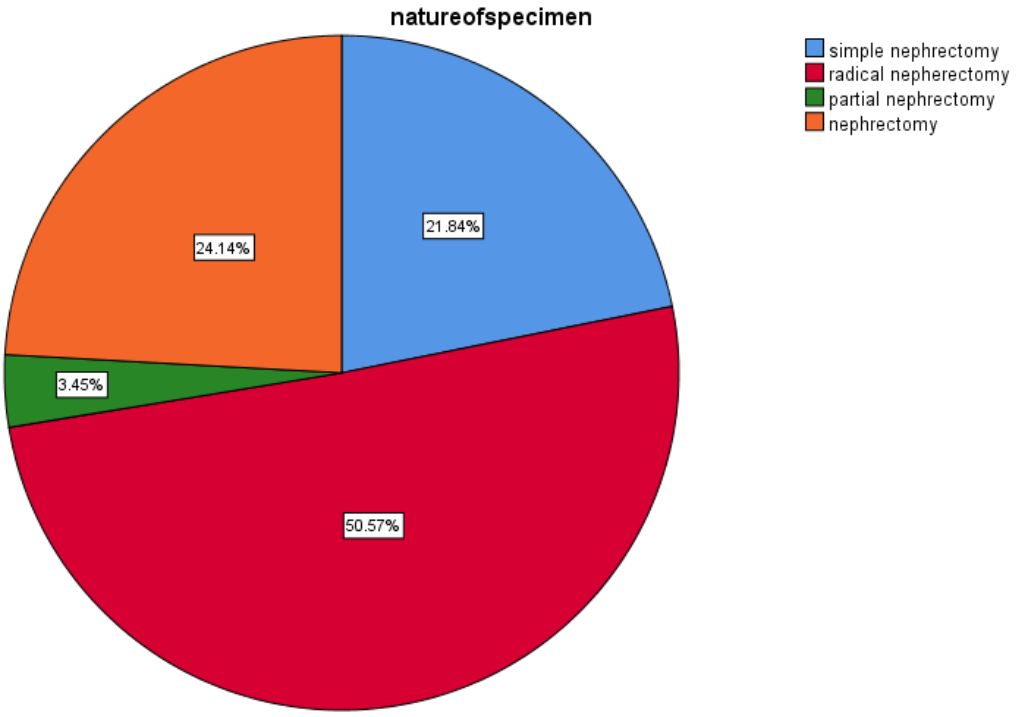
TABLE 5 ; DISTRIBUTION OF NEPHRECTOMY CASES BY LATERALITY at TASH, Addis Abeba, Ethiopia from 2017 to 2021

Of the total nephrectomies performed 87 were radical nephrectomies , 85 of which were performed for malignant disease and two for benign lesions . Out 38 simple nephrectomies done,3 were for cystic disease and 27 for nonneoplastic ,2 for benign and 6 for malignant . There were 6 partial nephrectomies of which 5 were done for malignant and 1 for non-neoplastic. The remaining 30 nephrectomies were done for 30 malignant, 2 benign, 9 nonneoplastic and 1 cytsic disease. 5 of the partial nephrectomies were performed for ccRCC and the remaining 1 for CGN.

Gross appearance and size of lesion was documented for neoplastic lesions the most common frequent description being gray white solid [n=58] followed by variegated [n=16 ranging in size from 1.5 cm to 24 cm in the greatest dimension . The pathologic stage of patients varies from PT1 to PT4. Out of 69 RCC , the pathological stage was found for 63 cases of which 22 [34.9 percent] were PT2 ,21 [33.3 percent] were PT1 . 19 [30.2 percent] and 1 [1.6 percent] cases were PT3 and PT4 respectively. 39 RCC cases having nuclear grade , of which maximum 14

[35 percent]cases have nuclear grade 2 and 11 [28.2 percent each] cases each of nuclear grade 1 and 3 and there were 3 [7.7] cases of nuclear grade 4. Maximum number of cases n =14[35 percent] have nuclear grade 2.

Figure 2 pie chart showing percentages of different types of nephrectomies at TASH, Addis Abeba, Ethiopia from 2017 to 2021



	MALE	FEMALE	TOTAL	percentage
CPN WITH HN	10	6	16	9.2
CPN	3	2	5	2.9
MULTICYSTIC DYSPLASIA	3	1	4	2.3
CGN	1	2	3	1.7
NEPHROLITHIASIA WITH CPN	1	2	3	1.7
CPN WITH HN AND PYONEPHROSIS	1	1	2	1.1
HYDRONEPHROSIS	0	2	2	1.1
TUBERCULOUS ABCESS	1	1	2	1.1
ACUTE ON CHRONIC PYELONEPHRITIS	1	0	1	0.6
HYDRONEPHROSIS WITH XGP	0	1	1	0.6
XGP	1	0	1	0.6
TUBERCULOUS PYELONEPHRITIS WITH SIMPLE CYST	1	0	1	0.6
CPN WITH ESRD	1	0	1	0.6

TABLE 6; Sex wise distribution of non-neoplastic lesions with frequencies and percentages at TASH, Addis Abeba, Ethiopia from 2017 to 2021

6. Discussion

In the present study , out of 174 nephrectomy cases 24.7 percent were non-neoplastic [n=43] and 75.3 percent [n=131 cases] were neoplastic .

Similarly higher proportion of neoplastic disease compared to non- neoplastic diseases were reported by Narang V, Garg B, Walia , Sood N , Malhotra v et al in a retrospective study conducted between 2006 and 2009 involving 155 nephrectomy cases in Ludhiana India where they found 52.9 percent [n=82] and 47.1 percent [n=73] neoplastic and non-neoplastic diseases respectively [24]. However, the results of this study differ from a 12 year retrospective study done in India at the UP University of Medical sciences by Mani K., Pratibha I.,et al [4] , on 111 nephrectomy cases in which were 63 percent [n= 70]non-neoplastic lesions and 37 percent [n=41] neoplastic lesions . The finding of the current study also differs from the results of a retrospective study by D Andualem , wuletawu ,teklebirhan on medical records of 73 patients at TASH between 2009 to 2011 which found 63 percent [n=46] of nepherectomies done for benign conditions [7]. In that study among the patients who underwent nephrectomy 38 (51.2%) had non or poor functioning kidneys due to obstructive uropathy [7]. In the current study, RCC is the most common neoplastic condition accounting for 53.4 percent of all neoplastic disease, of which clear cell RCC [n=44] accounts for 63.8 percent of all RCC followed by chromophobe RCC [21.7 percent, n=15] and papillary RCC 11.5 percent [n=8] ,RCC [1.5 PERCENT] , 1 VHL [1.5 percent] . These findings are in accordance with most reported series from developed countries where malignant disease of the kidney were the leading cause of nephrectomy. An increased number of nephrectomies were performed for malignant conditions of the kidney which was the result of change in the indication for nephrectomy during the last few decades in Norway, as reported by Beisland et al [28] .

Badmus TA et al., from Nigeria reported a series of adult nepherectomies in which 63.3 percent were performed for malignant conditions of the kidney of which RCC accounted for 72.2 percent [n=13] [29].

Though this study is in accordance to many other studies like shaila et al , Chitra et al[19,] with respect to having ccRCC the most common RCC variant ,the fact that chromophobe RCC is the second most common RCC variant in the current study is variable from many other studies which consistently report papillary RCC second and chromophobe RCC third [6,19,25] .

Most renal carcinomas are sporadic. Familial variants [4percent] consisting of VHL syndrome, Hereditary [familial] clear cell carcinoma and hereditary papillary carcinoma [25] . In the present study there was 1 case of VHL .

But the prevalence of RCC is more in female [n=36] than in male [n=33] with male to female ratio of 0.9;1 and most cases were observed between 41 to 60 . Hence the RCC patients in the present study are a bit younger than is stated in the literature as well as there are more females compared to male affected by RCC. Nephroblastoma is the second common malignancy with a total of 46 cases [35.1percent of all neoplastic 131 cases] in this study all performed for children 6 months to 7 years of age with mean age of 3.5 years . Besides there were 3 cases of multicystic dysplasia, 1 hydronephrosis and 1 case of malignant rhabdoid tumor of the kidney in this age group. Over all 54 nephrectomies were performed in children less than 16 with 46 nephroblastoma, 3 multicystic dysplasia, 3 cases of CPN with HN and 1 case each of HN and malignant rhabdoid tumor of the kidney. This constitutes 47 and 7 malignant and non-neoplastic conditions respectively accounting for 87 percent and 13 percent of nephrectomies respectively in children under 16.

These findings are comparable to result of study by Uchechukwu ,victor M.,sebastina et al [26] , a retrospective study performed on medical records of 52 patients who underwent nephrectomy between 2007 to 2016 in Nigeria university which revealed most of the malignancies to be nephroblastoma 67 percent [34 out 35] similar to a study by Bouhafs et al [27] in Morocco who reported 62.5 percent of nephrectomies for nephroblastoma in a retrospective study involving 80 nepherectomies, though lower than the present study of 85 percent nephrectomies done in children under 16 for nephroblastoma.

Nevertheless, this finding is contrary to other studies from pediatric nephrectomies from other parts of the world like reports by Omar I., Maher M., Reema M., et al a 9 years retrospective study between 2008 to 2016 conducted on hospital records 36 patients who underwent

nephrectomy in Riyad Saudi Arabia[34] revealed 91.7 percent were benign / malformation kidney disease with vesicoureteric reflux and ureteropelvic junction obstruction accounting 40 and 33.3 percent respectively . But in this study the male to female ratio was 2.6 to 1 in contrast to 0.6 to 1 in the present study. The present study is also variable with findings of Sammon et al [31] in USA who reported 73.8 percent of nephrectomies were for benign ; Daradakas in jordanan and Hammad in Newzeland reported 59 percent and 78.7 percent of nephrectomies for benign conditions, respectively [32,33].

In the present study 5 year old female child was diagnosed with malignant rhabdoid tumor of kidney accounting for 2.1 percent of all renal tumors in children similar to a study by Gulshan k . et al which found 1 case of malignnat rhabdoid tumor of kidney in a 3 year old [5]. Rhabdoid tumours is a mesenchymal tumor account for approximately 2% of all renal neoplasms in children. The mean patient age at diagnosis is approximately 1 year, and approximately 80% of patients are diagnosed in the first 2 years of life. Occurrence of rhabdoid tumour of the kidney in children older than 3 years is extremely unusual. Many previously reported examples of rhabdoid tumour of the kidney in children older than 5 years have subsequently proven to be renal medullary carcinomas [15

Primary tumors arising in the renal pelvis include urothelial carcinomas, squamous cell carcinomas, and adenocarcinomas. Over 90 percent of tumors of the renal pevis and ureter are urothelila in origin. In the present study 1 case of high grade invasive urothelial carcinoma [0.6 percent] observed similar to a study by shila et al [19].

Primary SCC of kidney is rare entity arising from the renal pelvis. The incidence of renal SCC among malignant renal tumors is in the range of 0.5 to 0.8 percent. In the present study two cases of KSCC [1.1 percent] were observed comparable to Ajay S .et al [6] .

There was one case of secondary choriocarcinoma diagnosed to a 22 year old female patient who presented with spontaneous rupture of kidney accounting for 0.6 percent of all cases. Choriocarcinoma is an aggressive tumour arising as a malignant transformation of the gestational trophoblastic disease or rarely from the germ cells in the ovary and from testicular mixed germ cell tumour. Renal involvement due to Choriocarcinoma is rare .There are reports of metastatic choriocarcinoma to the kidney one such report is by Sakaro, Olajide et al [33].

Of the neoplastic benign lesion 1 case of multicystic nephroma was found in a 59 years old man similar to a study by shaila et al[19] which found 1 cases of multicytic nephroma albeit in a 33 year old female . WHO classifies adult multicytic nephroma mixed epithelial and stromal tumor [15]

Among the non-neoplastic lesions CPN with HN was the most common inflammatory condition[n=16, 9.2 percent] for which nephrectomy was done and affects age groups between 10 to 60 with maximum number of cases seen between 21 to 30 years and mean age of 30.5 years . More males[n=10] are affected by CPN with HN than female[n=6]

This finding is similar to a study done by Ajay sing et al [6] which was a retrospective study done in Raipur City India between Jan 2013 up to Sep 2018 on 54 nephrectomy specimens which showed 16 (29.6%) cases were non-neoplastic and 38 (70.4%) were neoplastic and among the non-neoplastic 16 cases , 7(13%) were CPN with hydronephrosis . However, most number of CPN with HN observed between 31 to 40 which are slightly older compared to the current study in which most cases of CPN with HN were seen between 21 to 30 years. .

In the present study 1 case each of XGP and XGP with HN were observed [0.6 percent each] comparable to study by Ajay S et al[6].

7. Limitation of the Study

Relevant clinical, radiologic information are lacking from both patient request paper and icare

8. Conclusion

A wide Spectrum of histopathologic lesions comprising of neoplastic and non-neoplastic lesions were observed in this study. Neoplastic conditions predominate overall with nephroblastoma and Renal Cell Carcinoma being the most common malignancies occurring in children and adults, respectively. Chronic Pyelonephritis with hydronephrosis was the most common non-neoplastic condition encountered.

There is a decrease in nepherectomies done for non-neoplastic conditions in TASH compared to previous studies done in the same hospital.

9. Recommendation

Data archive of the department should be improved

It is important to improve data keeping both on hard copies and I care on the clinician side

It is important to document clinical, radiological information as well as the specific type of nephrectomy by clinician so that relevant data become available for future research purpose.

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