

Nephrectomy. A clinicopathological study

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Abstract: To provide the surgeon with a working knowledge of the histopathological diagnosis of nephrectomy cases, to correlate the clinical findings and indications with histopathological results and to see the relative frequency of each type and its specific pathologic characters this study was done. The study was conducted at Azadi teaching hospital and in the department of pathology, faculty of medical science, university of Duhok during a period from (Nov 2012 – Nov 2014). A total 161 nephrectomy specimens were examined grossly. Representative blocks were taken for histopathological examination. 76 percent (47.2) of the patients were males, (85) 52.8% were females, with male: female ratio of 1:1.08. The mean age was 35.6 years. On histological examination revealed in descending order 62.65% were inflammatory conditions (including chronic pyelonephritis, xanthogranulomatous pyelonephritis and tuberculous pyelonephritis). Adult type malignant conditions found in 26% of the total cases (including renal cell carcinoma and transitional cell carcinoma). Only one case was lymphoma and other metastatic carcinoma. 9.8 % were cystic lesions of the kidney, 4.96 % were pediatric tumors (including nephroblastoma only), 2.48% was angiomyolipoma. Chronic pyelonephritis is the most frequent pathologic indication for nephrectomy irrespective of age or sex. Xanthogranulomatous pyelonephritis is seen in age below 25 years and was usually associated with nephrolithiasis. Renal cell carcinoma is the most common kidney cancer in adults affects mainly males followed by transitional cell carcinoma and Nephroblastoma is the main type of malignant tumors of the kidney in children. Secondary in the kidney is rare.

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1. Introduction

Nephrectomy is a surgical procedure for the removal of kidney on patients with severe kidney damage from disease, injury, or congenital conditions (Table 1). These include cancer of the kidney (renal cell carcinoma); polycystic kidney disease (a disease in which cysts, or sac-like structures, displace healthy kidney tissue); and serious kidney infections. It is also used to remove a healthy kidney from a donor for the purposes of kidney transplantation^(1,2).

Nephrectomy is of many types; partial, simple and radical nephrectomy. Partial nephrectomy involve removing a small portion of the kidney. A simple nephrectomy performed for living donor transplant purposes requires removal of the kidney and a section of the attached ureter Radical nephrectomy involves removing the entire kidney including adrenal gland and the fatty tissue surrounding the kidney.^(3,4)

In a traditional, open nephrectomy, the patient is administered general anesthesia and a 6–10 inch (15.2–25.4 cm) incision through several layers of muscle is made on the side or front of the abdomen. The blood vessels connecting the kidney are clamped and cut, and the ureter is also cut between the bladder and kidney and clamped⁽⁵⁾.

Laparoscopic nephrectomy is a form of minimally invasive surgery that utilizes instruments on long, narrow rods to view, cut, and remove the kidney. The surgeon views the kidney and surrounding tissue with videoscope. The videoscope and surgical instruments are maneuvered through four small incisions in the abdomen, and carbon dioxide is pumped into the abdominal cavity to inflate it and improve visualization of the kidney. Once the kidney is isolated, it is secured in a bag and pulled through, approximately 3 inch (7.6 cm) wide, in the front of the abdominal wall below the navel. Although this surgical technique takes slightly longer than a traditional nephrectomy, preliminary studies have shown that it promotes a faster recovery time, shorter hospital stays, and less post-operative pain⁽⁶⁾.

A modified laparoscopic technique called hand-assisted laparoscopic nephrectomy may also be used to remove the kidney. In the hand-assisted surgery, a small incision of 3–5 inch (7.6–12.7 cm) is made in the patient's abdomen. The incision allows the surgeon to place his hand in the abdominal cavity using a special surgical glove that also maintains a seal for the inflation of the abdominal cavity with carbon dioxide. This technique gives the surgeon the benefit of using his hands to feel the kidney and related structures. The

kidney is then removed by hand through the incision instead of with a bag⁽⁷⁻¹¹⁾.

Table 1. Renal pathology

Renal pathology	
•	Congenital diseases of the kidney
•	Cystic disease of the kidney
•	Inflammatory condition
•	Obstructive uropathy
•	Benign renal tumors
•	Malignant renal tumors

2. Material and Methods

A prospective study of 161 nephrectomy specimens The study was conducted at Azadi teaching hospital and in the department of pathology, faculty of medical science, university of Duhok during a period from (Nov 2012 – Nov 2014), to provide the surgeon of the histopathological diagnosis of nephrectomy cases, to correlate the clinical findings and indications with histopathological results and the relative frequency of each type and its specific pathologic characters. The nephrectomy specimens were examined grossly. Representative blocks were taken for histopathological examination. The nephrectomy specimens (partial or radical) were included in this study at one academic center. The clinicopathologic

features of these cases were reviewed and categorized to identify risk factors of multifocality including age, gender, size and side of the tumor, of vascular invasion, Fuhrman's grade, and the clinical and pathological stages. The patients, for whom the nephrectomies were performed, included 74 males and 87 females. Their age range from 5 months to 80 years. The specimen, when received, was fixed in 10% formalin, inspected and described grossly, weighed, measured and sliced. Each specimen was sampled by 2-4 blocks selected in accordance with the pathologic process that necessitated nephrectomy. The selected blocks were then processed through, ascending concentration of alcohol, cleared by xylene, embedded in paraffin and cut at 4 μ thickness. Sections from each block were stained conventionally by Haematoxylin and Eosin stain and examined. Immunostain were done whenever it indicated.

3. Results

Out of the total number of cases; 76 percent (47.2) of the patients were males, (85) 52.8% were females, with male: female ratio of 1:1.08. Their ages ranged from 5 months to 80 years with mean age was 35.6 years (Table 2) summarizes the different pathological conditions of the specimens received and the patients sex distribution.

Table 2. Renal pathology with sex distribution according to their frequency.

Renal pathology	No. Of patients (%)	Male	Female	M : F ratio
Inflammatory conditions				
Chronic pyelonephritis	77 (47.82)	27	50	1:1.5
Xanthogranulomatous PN	13 (8)	5	8	1:1.6
Rejection	10 (6.21)	6	4	1.5:1
Tuberculous PN	1 (0.62)	1	-	-
Adult malignant renal tumors				
Renal cell carcinoma.	26 (16.14)	16	10	1.6:1
Transitional cell carcinoma	5 (3.10)	5	0	-
Rhabdoid tumor	2 (5.5)	2	0	-
SCC	1 (0.62)	1	0	-
lymphoma.	1 (0.62)	1	0	-
Metastatic	1 (0.62)	1	0	-
Pediatric renal tumors				
Nephroblastoma	8 (4.96)	3	5	1:1.6
Mesoblastic nephroma.	-	-	-	-
Clear cell sarcoma.	-	-	-	-
Cystic condition				
Dysplastic kidney	6 (3.72)	4	2	2:1
Simple cyst.	-	-	-	-
Polycystic kidney disease	4 (2.48)	2	2	1:1
Benign tumors				
adenoma	1 (0.62)	1	0	-
multicystic nephroma	1 (0.62)	0	1	-
Angiomyolipoma	4 (2.48)	1	3	1:3
Total	161(100)	76 (47.2%)	85 (52.8%)	1:1.1

On histopathological examination, in descending order are 62.65% were inflammatory conditions (including chronic pyelonephritis, xanthogranulomatous pyelonephritis and tuberculous pyelonephritis), Adult type malignant conditions found in 21.1% (including renal cell carcinoma and transitional cell carcinoma), 9.8 % were cystic lesions of the kidney, 4.96 % were pediatric tumors (including nephroblastoma only), 2.48% was angiomyolipoma. One case was lymphoma and other metastatic carcinoma.

4. Discussion

The kidney like other organs is liable to different diseases vary from congenital diseases, inflammatory and neoplastic lesion. In the present study, out of the 161 Nephrectomy specimens studied, 72.6% had benign lesions and 27.3% had malignant lesions. Thus, benign lesions comprised the vast majority of the cases in our study. A similar predominance of benign lesions was observed in other studies (Table 6). Among nephrectomy specimens, 52.8% were of females and 47.2% of males, with M:F = 1:1.1. This ratio is in concordance with the M:F ratio of 1:1.05 observed by Mohammad Rafique⁽¹²⁾ and Aiman A⁽¹³⁾. However, El Malik et al⁽¹⁴⁾ reported 61% nephrectomy specimens in males and 39% in females with M:F = 1.9:1.

The main clinical feature that the patients presented with was non functioning kidney (52 patients), lump abdomen (51 patients), flank pain (51 patients). This was followed by hematuria (7 patients), four of patients who presented with hematuria had malignant lesions. These observations were incomparable to those in the study conducted by El Malik et al⁽¹⁴⁾ and Popat et al⁽¹⁵⁾. These studies showed that the main presentation was flank pain

The most common indication for nephrectomy in the present study was chronic pyelonephritis (56.44%), followed by renal cell carcinoma (16.14%). Chronic pyelonephritis has been reported as the most common clinical indication in the studies by El Malik et al⁽¹⁴⁾, Popat et al⁽¹⁵⁾ Adamson et al⁽¹⁶⁾ and Ibrahim Ghalayeni⁽¹⁶⁾. Thirteen cases and one case were xanthogranulomatous pyelonephritis. El Malik et al⁽¹⁴⁾, 6 cases (1.1%) Popat et al⁽¹⁵⁾, observed 2 cases (2.5%) and D'Costa et al⁽¹⁷⁾ found 10% cases of xanthogranulomatous pyelonephritis in 188 nephrectomy specimens. Among the cases of xanthogranulomatous pyelonephritis in the present study, 5 (38.46%) were male and 8 (61.54%) female. Thus, a female predilection was noted. A similar female predilection was observed by Parsons et al⁽¹⁸⁾ and KB Koh⁽¹⁹⁾. A majority of patients, i.e., 10 cases (77%), belonged to the age group below 30 years.

Tuberculosis was found in 1 case (0.62% of cases). Ziehl – Neelsen stain was performed, but

unfortunately, it was negative, but the presence of epithelioid and caseating granulomata are typical of tuberculosis can be considered as an acceptable criteria for tuberculous diagnosis in our locality, which is unlike the situation in non-endemic areas where the identification of the microorganism is mandatory for the diagnosis⁽²⁰⁾.

In the present study, a total of 36 (27.3%) malignant lesions were observed; of these, renal cell carcinomas seen in 26 cases (59%) (Table 3). This was similar to the findings of Rafique⁽¹²⁾ who observed that the majority of malignant neoplasms (97%) of the kidney were renal cell carcinomas. Popat et al⁽¹⁵⁾ in their study, found that 70% of malignant lesions were accounted for by renal cell carcinomas.

Table 3. Malignant tumor of kidney

Types	No. (%)
RCC	26 (59.10)
Wilm's tumor	8 (18.18)
TCC	5 (11.36)
Rhabdoid tumor	2 (4.50)
SCC	1(2.27)
Lymphoma	1(2.27)
Metastatic	1(2.27)
Total	44 (100%)

Among renal cell carcinomas, a majority of cases (61.5%) were seen in males and 38.5% in females. microscopically, the clear cell type of renal cell carcinomas was the predominant type of tumor observed, involving 17 (65.38%) cases. This was followed by papillary type in 4 (15.38%) cases (Table 4). Subtypes of RCC in comparable to other studies is seen in (Table 5).

Table 4. Histological variants of renal cell carcinoma

Renal Cell Carcinoma	No. (%)
Clear cell type	17 (65.38)
Papillary	4 (15.38)
Chromophobe type	4 (15.38)
Sarcomatoid type	1 (3.84)
Total	26 (100%)

Primary squamous cell carcinoma of the kidney is a very rare entity. The incidence of renal squamous cell carcinomas among malignant renal tumors is in the range of 0.5-0.8%, as reported by Li et al⁽²¹⁾ and Blacher et al⁽²²⁾. In the present study, one case of squamous cell carcinoma was seen in a 30-year-old man.

Benign tumors of the kidney are rarely found in nephrectomy specimens but are common in postmortem examination and as an incidental finding in imaging study during life (Table 6). Angiomyolipoma

is the most common benign tumor and is of interest because it may be misdiagnosed as cancer by imaging

study prenephrectomy ^(23,24). Four case (2.48%) of angiomyolipoma was seen in our study.

Table 5 Subtypes of RCC in comparable to other studies

Subtypes of RCC	Baltaci et al 103 cases ⁽²⁶⁾	Kitamura et al 105 cases ⁽²⁷⁾	Current study 26 cases
Clear cell type	75.7%	87.6%	65.38%
Papillary cell type	0%	4.8%	15.38%
Chromophobe cell type	4.9%	1.9%	15.38%
Sarcomatoid cell type	4.9%	1.9%	3.84%

Table 6. Various studies comparing incidence of benign and malignant lesions

Study	Benign %	Malignant %
Rehan et al ⁽²⁸⁾	11	89
Ghalayini ⁽¹⁶⁾	70.44	29.5
Rafique ⁽¹²⁾	76.6	23.4
Aiman ⁽¹³⁾	77.2	22.8
Present study	72.6	27.3

Nephroblastoma was the most common pediatric solid renal tumor with mean age at diagnosis of 2.3 years and it is comparable to other study in which the mean age was 3.25 year (83). It was more common in girls with M:F ratio of 1:1.6, in contrast to other study in which M:F ratio was 1.3:1 ⁽²⁵⁾.

Conclusion:

It is mandatory for every nephrectomy specimen to be subjected to a details of histopathological examination for a clinico-morphological correlation to ensure proper management. Chronic pyelonephritis was the most frequent pathologic indication for nephrectomy irrespective of age or sex and xanthogranulomatous pyelonephritis was not uncommon especially in younger peoples. Renal cell carcinoma was the most common kidney cancer in adults affects mainly males followed by transitional cell carcinoma. Nephroblastoma was the main type of malignant tumors of the kidney in children. Secondary in the kidney is a rare.

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