

Research Article

The histopathological study of transmogrification of 20 cases of tenous renal carcinomas-Study of 2 year

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Abstract

As we know Cancer begins when cells in a part of the body start to grow out of control. Renal cell carcinoma (RCC), also known as renal cell cancer or renal cell adenocarcinoma, is by far the most common type of kidney cancer. About 9 out of 10 kidney cancers are renal cell carcinomas. This study has been put forward to glance, analyse record and understand the neoplastic lesions of the kidney. 20 cases of simple and radical nephrectomy specimens were included in this study out of which majority were clear cell variant (35%), chromophobe (15%), papillary, collecting duct and sarcomatoid (5% each), clear cell sarcoma (10%), angiomyolipoma (5%) and among paediatric tumors wilms tumor constituted (20%) of all tumors. The study shows that clear cell variant of renal cell carcinoma (rcc) is the most common neoplastic lesion whereas wilms tumor is the predominant tumor in childhood.

Keywords: neoplastic , nephrectomy specimens, kidney.

1. Introduction

Involvement of the kidney by neoplastic lesions is not uncommon. Renal cell carcinoma is by far the most common type of kidney cancer.¹ Nephrectomy remains the treatment of choice and therapeutic modality for the patients to free them of pain and varied chronic life debilitating and destructive conditions. The etiology and clinical scenerio remains different in the adult and childhood patients.^{2,3,4} There has been an increase approach towards laproscopic mode in the last few years.^{5,6,7} Still in many rural setups and also certain developing cities open surgical procedure remains the resort to the neoplasms. Our present study analyzes the neoplastic lesions of the kidney according to the age, gender, site and histopathology .

2. Materials and Methods

Study was done prospectively from September 2011 to September 2013, a period of 24 months. The final diagnosis was done after carefully examining and correlating the clinical feature, gross and microscopic findings including special stains and immunohistochemistry whenever required. Grossing of the formalin fixed specimens was done according to standard protocol.²⁸ Sections of 5 microns thickness were cut and routinely stained with haematoxylin and eosin. Detailed analysis by light microscopy was done and recorded. Required clinical and imaging details were obtained for all the cases.

3. Results

Present study was carried out on a total of 20 nephrectomy specimens.

Table 1: showing number of cases and percentage in decreasing frequency.

Histopathological Type	No. of Cases	Percentage
Clear Cell RCC	7	35%
Chromophobe RCC	3	15 %
Papillary RCC	1	5%
Collecting Duct	1	5%
Sarcomatoid	1	5%
Angiomyolipoma	1	5%
Clear Cell Sarcoma	2	10 %
Wilms Tumor	4	20%

In the present study clear cell variant of Renal cell carcinoma(RCC) (35 %) was the most common malignant lesion followed by Wilms tumor (20%).

Table 2: Frequency of neoplastic lesions according to sex

Diagnosis	Male	Female
RCC	11	2
Wilms Tumor	3	1
Angiomyolipoma	1	0
Clear Cell Sarcoma	2	0

In this study majority of neoplastic lesions were observed in males 17 cases (85 %) and 3 cases in females (15%). Right sided neoplastic lesions were more in comparison to left sided lesions

Table 3: frequency of neoplastic lesions in relation to side

Diagnosis	Right Kidney	Left Kidney
RCC	3	10
Wilms Tumor	3	1
Angiomyolipoma	1	0
Clear Cell Sarcoma	1	1
Total	8	12

In the present study we have observed that RCC is the most common type of adult renal neoplasm and clear cell variant of RCC is the most common type, it is more common in males and mostly involves the upper lobe of the kidneys with tumor cells showing large and clear cytoplasm (Fig 1), papillary variant of RCC (Fig 2) is less common and is mostly bilateral with complex branching papillae and variegated appearance, cytoplasm varies from pink to clear. Chromophobe (Fig 3) variant of RCC remains uncommon with male preponderance, generally enlarged and homogenous, well circumscribed lesion with microscopically solid pattern of cells. Sarcomatoid RCC involve mostly right kidney with equal male-female preponderance presenting as enlarged mass with variegated appearance and majority of tumor is formed by spindle cells. Collecting duct RCC (Fig 4) is extremely rare and mostly seen in medulla in older age. Wilms tumor (Fig 7) forms majority of childhood neoplasms with majority of the cases having the characteristic triphasic pattern involving the right kidneys and predominantly occurs in males, the age group varies from 9 months to 8 years. Clear cell sarcoma (Fig 6) presents as an enlarged kidney with nodular homogenous grey white appearance with characteristic chicken wire pattern. Angiomyolipomas present very rarely. immunohistochemical panel was done for renal cell carcinomas. gp 200 and ADAM 9 protein came positive in different variants. (fig 8, fig 9)

Left sided lesions were more than right sided lesions. Most of the renal cell carcinomas arise on the left side (76%). Wilms tumor was seen more often on the right side (70 %).

Table 4: location in the neoplastic lesions of the kidney

Neoplastic Lesion	Upper Pole	Mid Portion	Lower Pole	Entire Cut Surface	Pelvis
Rcc	8	1	3	1	0
Wilms Tumor	0	0	0	4	0
Angiomyolipoma	0	1	0	0	0
Clear Cell Sarcoma	0	0	0	2	0

In cases of RCC mostly upper pole was involved whereas in cases of wilms tumor it was mostly the entire cut surface that was involved.

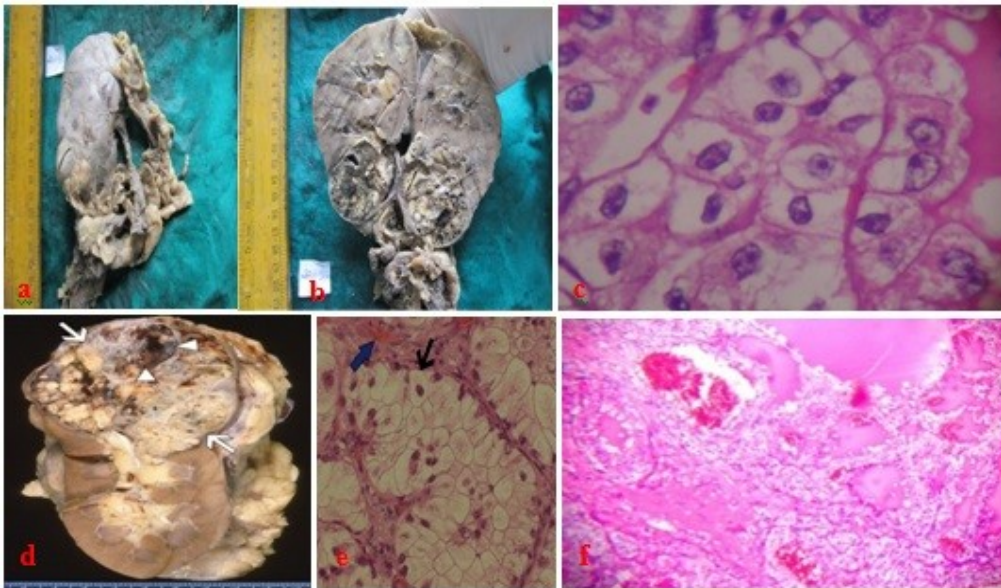
Table 5: Gross features of kidney in RCC:

Gross Findings	No.
Enlargement	13
Haemorrhage	02
Necrosis	03
Capsular Involvement	01
Cystic Degeneration	01
Involvement Of Renal Pelvis	01

Table 6:

Cell type	No. of cases	Percentage
Clear cells	10	76%
Granular cells	01	7%
Mixed cells	02	15%

Fig 1 (a,b,c,d,e,f)



- a) Right nephrectomy specimen measuring 15x8x6 cms.
- b) shows a well defined mass with variegated yellow surface measuring 4x4 cms arising from one of the pole.
- c) Clear Cell RCC with mild variation in size of the nuclei and clear cytoplasm : Larger nuclei with irregular contour and nucleoli visible at X400. Grade 2.
- d) Gross specimen of a clear cell RCC shows variegated nodular growth (arrows) with areas of haemorrhage and necrosis (arrowheads).
- e) (original magnification, ×200; hematoxylin-eosin [H-E] stain) of a clear cell RCC shows clear cells (black arrow) with prominent cell borders and prominent vasculature (blue arrow).
- f) Macrocysts and microcysts.

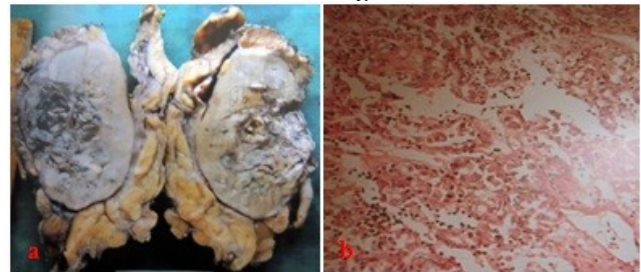
Fig 2. a) Gross of Papillary Carcinoma b) Eosinophilic Cytoplasm and Pseudostratified Nuclei on Papillary Cores



3. a) Gross of chromophobe RCC On Upper Pole b) Raisenoid Nucleus And Promnent Cell Margins on Microscopy.



4.a) Gross Showing Well Circumscribed Lesion in Medulla, b) Tubulopapillary Pattern and Hobnail Pattern in Collecting Duct Tumor.



5. Angiomyolipoma- a) Gross. b) Microscopy



6. a) Gross With Homogenous Cut Surface In Clear Cell Sarcoma b) Chicken Wire Pattern Microscopically



7. a) Gross b) Microscopy Showing Blastemal, Stromal And Epithelial Component In Wilms Tumor.

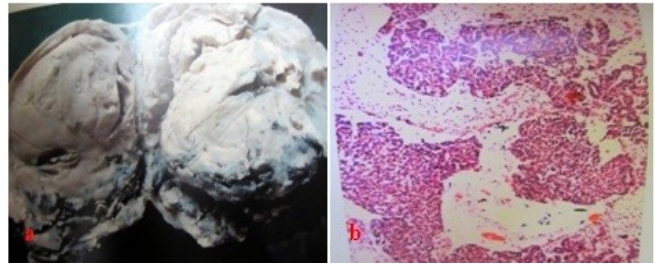


Fig-8

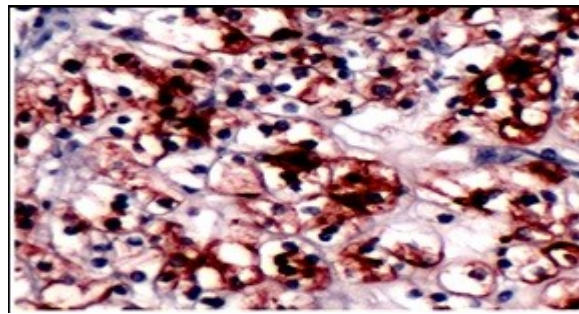
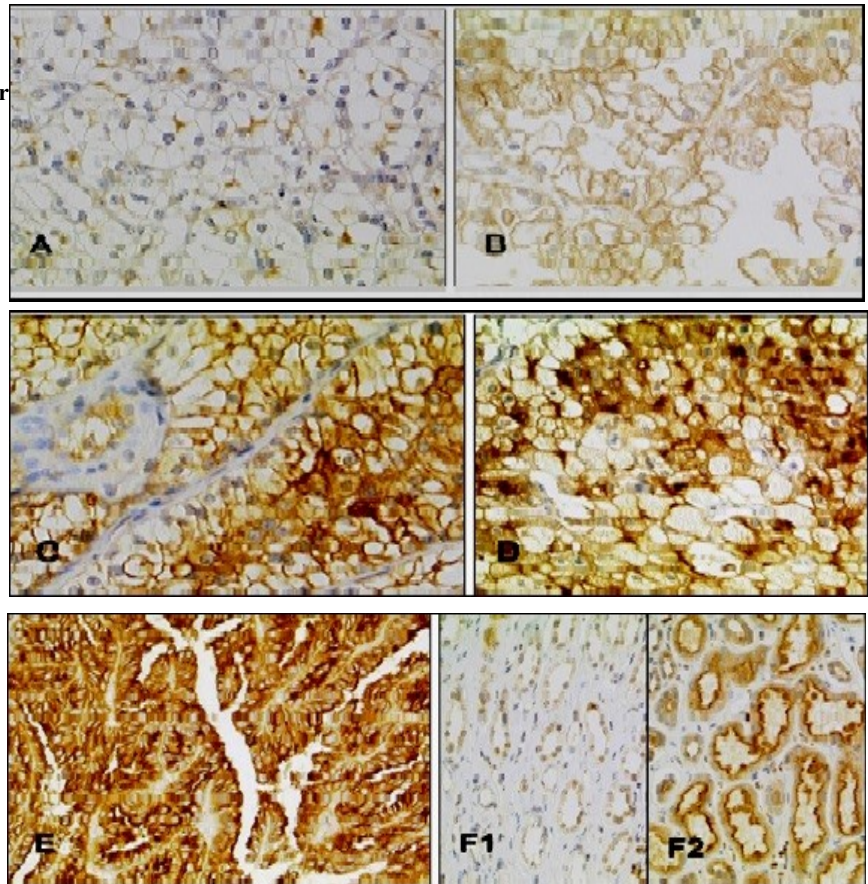


Fig 9: Immunohistochemistry for (ADAM 9 PROTEIN)

A-C:Clear Cell Carcinoma Positive for ADAM 9 Protein Expression, D- Paillary Variant Strongly +, E- Chromophobe Pattern-Strongly +, F(1-2) Normal Renal Tissue With Bleak +.



4. Discussion

Renal cell carcinoma (RCC), also known as *renal cell cancer* or *renal cell adenocarcinoma*, is by far the most common type of kidney cancer. About 9 out of 10 kidney cancers are renal cell carcinomas.⁸ Although RCC usually grows as a single mass (tumor) within a kidney, sometimes there are 2 or more tumors in one kidney or even tumors in both kidneys at the same time. Some of these cancers are noticed only after they have become quite large, but most are found before they metastasize (spread) to distant organs in the body.^{9,10,11} Often they are found on CT scans or ultrasounds that are being done for concerns other than kidney cancer.¹¹

Like most cancers, RCC is hard to treat once it has spread.¹² There are several subtypes of RCC, based mainly on how the cancer cells look under a microscope. Knowing an RCC subtype can be a factor in deciding treatment and can also help to determine if your cancer may be due to an inherited genetic syndrome.¹³ RCC constitutes 90% of all adult renal malignancies.¹⁵ Peak age is sixth to seventh decade. Male to female ratio – 2 : 1 clear cytoplasm within a delicate vascular network. Etiological factors are Cigarette smoking obesity, Hypertension, Environmental factors: phenacetin and acetaminophen use for long duration, exposure to cadmium, petroleum products and industrial chemicals, von Hippel-Lindau disease, Tuberous sclerosis, Clinical features Triad: hematuria, pain and flank mass and Others like weight loss, anorexia, fever, raised ESR, amyloidosis.^{14,15,16} Produces paraneoplastic syndromes like pseudo hyperparathyroidism, erythrocytosis, hypertension, gynecomastia.¹⁶

Classification of Renal cell Tumors (according to WHO):

- Clear cell renal cell carcinoma
- Multilocular clear cell renal cell carcinoma
- Papillary renal cell carcinoma
- Chromophobe renal cell carcinoma
- Carcinoma of the collecting duct of Bellini
- Renal medullary carcinoma
- Xp11 translocation carcinoma
- Carcinoma associated with neuroblastoma
- Mucinous tubular and spindle cell carcinoma
- Renal cell carcinoma, unclassified
- Papillary adenoma
- Oncocytoma

4.1 Variants of Renal Cell Carcinoma^{27,28}

4.1.1 Clear cell renal cell carcinoma

This is the most common form of renal cell carcinoma. When seen under a microscope, the cells that make up clear cell RCC look very pale or clear. Architecturally diverse – solid, alveolar and acinar patterns. Typically contain a regular network of small, thin-walled vessels. Cytoplasm is filled with lipids and glycogen, which are dissolved in routine histological processing, creating a clear cytoplasm surrounded by a distinct cell membrane (Fig 1) Clear cell RCCs react with antibodies to brush border antigens, low molecular weight cytokeratins, CK8,CK18, CK19, AE1, Cam 5.2 and vimentin. The majority of clear cell RCCs react positively for renal cell carcinoma marker CD10 and epithelial membrane antigen.¹⁷ Chromosome 3p deletions have been observed in clear cell tumours of the kidney and are regarded as the initial event in clear cell cancer development.¹⁸ The Fuhrmans Grading Critereon used to grade renal cell carcinomas.

Nuclear grading scheme for RCC

G1 : Small, round, uniform nuclei with absent or inconspicuous nucleoli.

G2 : Larger nuclei with irregular contour and nucleoli visible at X400.

G3 : Still larger nuclei with obviously irregular contours and large nucleoli.

G4 : Nuclei generally similar to G3 with bizarre, contours and chromatin clumps.

Prognostic Factors in Clear Cell Renal Cell Carcinoma

- Tumor size : Size of the primary tumor relates to prognosis for the very small (<3cm) and the very large (>12cm) tumors but not for those between these extremes, which represent the large majority and is classified based on the TNM classification.^{19,20,21}

- Renal vein invasion : Microscopic invasion is an important predictor of relapse.
- Invasion of renal pelvis : No prognostic significance.
- Microscopic grade : Nuclear grading is an important prognostic factor.^{19,22}
- Clear versus granular cytoplasm : Clear cell tumors are less aggressive than granular cell tumors.

Above list briefly shows the various prognostic features important in diagnosing RCC.

4.1.2 Papillary renal cell carcinoma

This is the second most common subtype - about 1 case in 10 is this type. These cancers form little finger-like projections (called *papillae*) in some, if not most, of the tumor. Some call these cancers *chromophilic* because the cells take in certain dyes and look pink under the microscope. (Fig 2)²⁸

4.1.3 Chromophobe renal cell carcinoma

This subtype accounts for about 5% (5 cases in 100) of RCCs. The cells of these cancers are also pale, like the clear cells, but are much larger and have certain other features that can be recognized (Fig3).^{6,7, 23}

4.1.4 Collecting duct renal cell carcinoma

This subtype is very rare. The major feature is that the cancer cells can form irregular tubes (Fig 4).^{24,25}

4.1.5 Wilms Tumor

Nephroblastoma or Wilms tumor is a paediatric tumor with peak incidence within 8 years of life. Grossly tumor presents with grey white and focal areas of hemorrhage and mostly shows triphasic pattern mostly involving the entire kidney (Fig 7).^{5,6,7,25}

4.1.6 Angiomyolipoma

It is a rare tumor of the kidney in which grossly the kidneys are enlarged with variegated appearance. Microscopically bundles of smooth muscle fibers, fat cells and irregular thick walled blood vessels are seen. (Fig 5)^{7,25}

4.1.7 Clear cell sarcoma

Presents as an enlarged tumor mass with cut surface showing nodular and homogeneous grey white areas, microscopically cells are epithelioid with clear cytoplasm having round to oval nuclei with fine chromatin. Characteristic chicken wire pattern is seen. (Fig 6)

Thus the neoplastic lesions of the kidney can present singly or occur as a mixture of its variants, but majority are grade 1 and nephrectomy continues to be the procedure of choice surgically. Wilms tumor remains to be the most common childhood tumor and clear cell variant remains to be the commonest of all the Renal cell carcinomas.

Immune histochemical studies were done on the various tissue sections of RCC and its variant, gp 200 and ADAM 9 protein came positive for these cancers. (fig8, fig 9(a-f)).

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