LECTURE 6:

TUMOURS OF THE KIDNEY AND URINARY TRACT

OBJECTIVE

At the end of the lecture the students will be able to:

I. **Recognize common benign tumors of the kidney.**

II. **Describe the pathological features of renal cell carcinoma and Wilm's tumor.**

III. **Recognize the predisposing factors and features of transitional cell and squamous carcinoma of the urinary bladder .**

TUMORS OF THE KIDNEY

Like any other tumor it has two types of symptoms:

General: ''weight loss, fatigue, anemia, unexplained fever (pyrexia), anorexia and myalgia''* .

Specific: Related to the site of tumor.

➢ BENIGN TUMORS OF THE KIDNEY: (Rare)

1- Benign tubular adenoma (Papillary cortical adenoma):

- ✓ usually Small tumor less than 1 cm in diameter.
- ✓ Pale nodules in the cortex of the kidney.
- ✓ Asymptomatic (found it incidentally).
- ✓ Sometimes it is called ''leave me alone lesion''.
- ✓ It may be a precursor lesion to renal cell carcinoma.

Under the microscope: **subcapsular** papillary adenoma shows tubules arranged in a papillary fashion.

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* These are also called cachexia syndrome.

2- Oncocytic cell adenoma (Oncocytoma):

- ✓ In their large size, clinical and radiological charcter. It Looks like renal cell carcinoma*(chromophobe renal carcinoma), except that it has central scar
- ✓ Arise from intercalated cells of collecting duct.
- ✓ **Oncocyte** is an epithelial cell characterized by an excessive amount of mitochondria, resulting in an abundant acidophilic, granular cytoplasm.
- ✓ it is worse than tubular adenoma, because it reaches big size and can predispose to renal cell carcinoma

How we distinguish it from renal cell carcinoma?
Radiology: central fibrous scar. (x-ray)
Biopsy: oncocytes.
EM: a lot of mitochondria.
Genetic studies(molecular genetics): loss of chromosomes 1, 14, and Y .

3- Angiomyolipoma of the kidney:

It is hamartoma tumor consists of (Angio: blood vessels, myo: smooth muscle cells, lip: lipocyte)

- ✓It can reach big size.
- ✓Usually It is bilateral.
- ✓It can be seen in people with neurological problems (**tuberous sclerosis***).
- ✓Causes hemoperitoneum (Presence of blood in the peritoneal cavity), which is the differential diagnosis of this tumor.

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* We can differentiate between them by doing molecular genetics

* Is a rare multi-system genetic disease that causes benign tumors to grow in the brain and on other vital organs such as the kidneys, heart, eyes, lungs, and skin.

➢ MALIGNANT TUMORS OF THE KIDNEY:

1- Renal cell carcinoma (Clear cell carcinoma of the kidney, Hypernephroma, or Grawitz tumor):

- ✓ Large tumor, and it is the most common kidney tumor (more than the benign).
- ✓ Sometimes they call it hypernephroma, because it likes upper pole of the kidney, but it may seen in the middle or lower pole.
- ✓ Originates from renal tubular epithelium.
- ✓ **Common in male especially old male between 50 -70.**
- ✓ **Also the incidence will increase in smokers.**
- ✓ Like to invade veins (renal vein, IVC).

Clinical Presentation: In many patients, the tumor remains silent and is discovered only after its metastases have produce symptoms. If he is lucky, he will have **triad symptoms** to diagnose him :

- **frank ''Gross'' hematuria**
- **flank pain**
- **mass lesion in the flank**

- Also there are general symptoms **(fever mostly)** and **secondary polycythemia** due to secretion of erythropoietin from the tumor, increase production of RBCs. Sometimes **hypercalcemia** due to secretion of PTH* from the tumor.

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* Parathyroid hormone enhances active reabsorption of Ca in the DCT and thick ascending loop of henle

Classifications of Renal cell carcinoma (RCC)

Basis on morphological and growth pattern

1- clear cell carcinoma:

- It's a classical type of RCC
- The tumor can be sporadic.
- Sometimes they have abnormalities in chromosome 3 .
- Also occurs in familial form or in association with Von Hippel-Lindau syndrome and acquired cystic kidney disease due to long term of dialysis.

Von Hippel-Lindau syndrome (VHL): Autosomal dominant disease caused by mutation in **VHL gene** on chromosome **3**, which is tumor suppressive gene and those people with this syndrome may have **hemangioblastomas** in the brain (vascular tumor), also they develop **PKD*** or renal cell carcinoma.

- **Gross appearance:** well circumscribed mass, Yellowish pale in color with area of hemorrhage.

Under the microscope: - polygonal clear cells *, papillary areas or nodules.

- Prognosis: Bad

2- papillary renal cell carcinoma:

- Occurs in familial or sporadic form.
- In hereditary, there is **Mutation on chromosome 7 MET gene** .
- Prognosis: Good

3- chromophobe renal carcinoma:

- Rare type of renal cell carcinoma
- Arise from intercalated cells of collecting duct.
- Happen due to multiple losses of entire chromosomes.
- prognosis : Good

*Polycystic Kidney Disease

*It locks clear because the cytoplasm contains glycogen & lipids and they

2- Wilm's tumor (Nephroblastoma):

✓ The most common renal neoplasm that occurs in children between ages of 2-5 years.

✓ It originates from primitive metanephric tissue.

Clinical presentation

The patient present with big abdominal mass in flank area, and general symptoms with irritability, the child not gaining weight and not playing, also he looks abnormal to his parent.

- It may primary or associated with syndrome.

Three groups of congenital malformations are associated with an increased risk for development of Wilms tumor:

1- WAGR syndrome: W= Wilms tumor, A= Aniridia*,G= Genital abnormalities, R= mental Retardation.

2- Denys-Drash syndrome (DDS): this syndrome is characterized by gonadal dysgenesis and renal abnormalities also have an extremely high risk for the development of wilms tumor.

BOTH of these syndrome are associated with deletion in Wilms Tumor 1 (WT1) genes on chromosome 11, which is suppressive gene

3- Beckwith-Wiedemann syndrome (BWS): these patients exhibit enlargement (organomegaly) of individual body organs like (tongue, kidney, or liver) or entire body segments (hemihypertrophy).

THIS syndrome is associated with deletion in Wilms Tumor 2 (WT2) or Insulin-like Growth Factor-2 (IGF2) genes on chromosome 11

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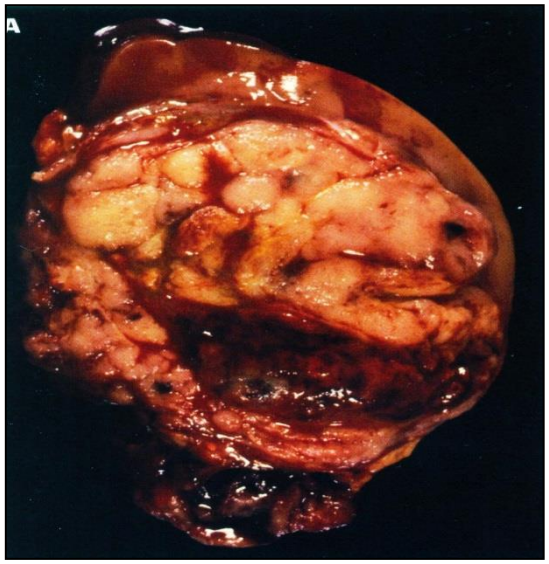
* (Absence of the coloured part of the eye, the iris)

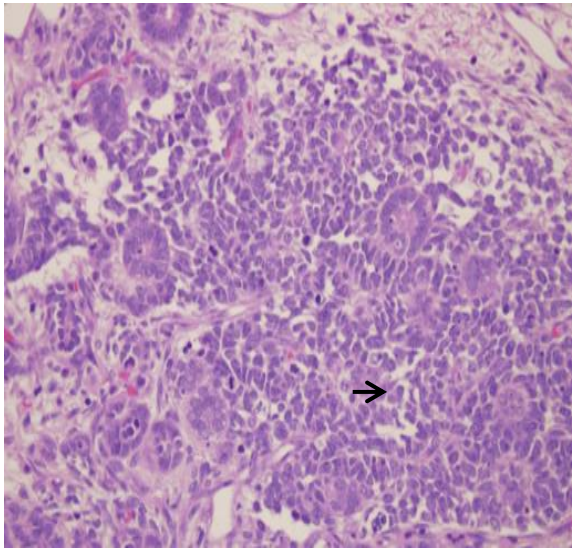
2- Wilm's tumor (Nephroblastoma):

- **Gross appearance:** white mass with hemorrhagic areas.

- **Under the microscope:** primitive undifferentiated blue cells (blastema cells), sometimes they try to make primitive Glomeruli or renal tubules and mesenchymal cells such as cartilage, and skeletal muscle cells (favorable histology).

Prognosis: good especially if it sporadic (not associated with syndrome)



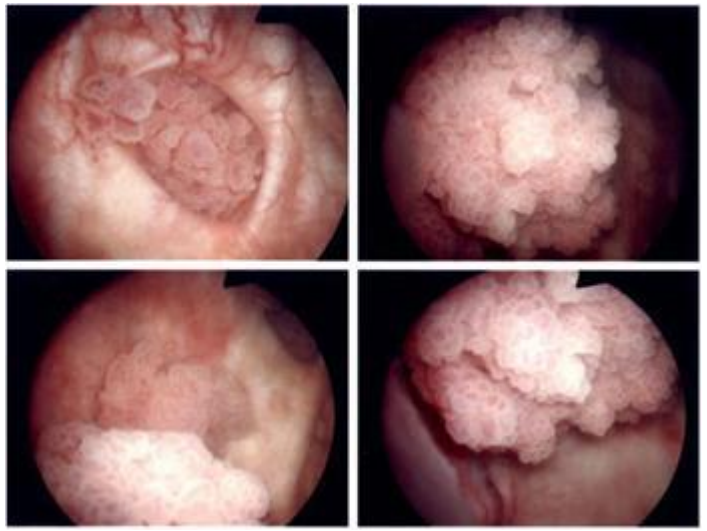


3- Transitional cell carcinoma of:

A. Renal calyces, pelvis and ureter : arise from transitional epithelium and it is usually papillary growth, it can be **multifocal**.
B. Urinary bladder: papillary fungating tumor.

*Transitional cell carcinoma in situ means it didn't invade the basement membrane yet but if we leave it, it will do.

- Patient usually presents with hematuria.



Risk factor:

✓ Analgesic for Long term of use (NSAIDs).
✓ **Long term with Cyclophosphamide** ''anticancer''
✓ **Schistosomiasis** ''Bilharzia''
✓ **Industrial exposure** due to azo dyes like **analine**: those dyes get metabolize in liver and convert to nephthylamine and beta nephthylamine which is carcinogenic agents.

Diagnosis:

✓ urine cytology (transitional malignant cells).
✓ uroscopy.

4- Squamous cell carcinoma of the urinary bladder:

- Metaplasia of transitional epithelium to squamous epithelium.
- caused by chronic irritation of UB like renal calculi and Schistosomiasis.

5- Urachal Tumour:

- Rare tumour
- A bladder tumour that arises from the urachus

MCQs

1/ Which one of the following could be a predisposing factor for clear cell carcinoma?

A. Benign tubular adenoma
B. Oncocytic cell adenoma
C. Wilms tumor
D. Transitional cell carcinoma

2/ What are the chromosomes that may be absent in case of oncocytic cell carcinoma?

A. 11,12,y
B. 4,6,x
C. 5,9,y
D. 1,14,y

3/ Which one of the following tumors characterized by hemoperitoneum?

A. Papillary cortical adenoma
B. Oncocytoma
C. Angiomyolipoma
D. Clear cell carcinoma

4/ Renal cell carcinoma has the following features?

A. Invade veins, male between 50-70
B. Invade lymphatic vessels, male between 50-70
C. Invade veins , female 50-70
D. Invade veins ,male 20-50

1-B
2-D
3-C
4-A

MCQs

5/ Which one of the following tumors may be characterized by polycythemia?

A. Benign tubular adenoma
B. Oncocytic cell adenoma
C. Wilms tumor
D. Hypernephroma

6/ VHL gene on chromosome 3 is ?

A. Immune suppressive gene
B. Abnormal growth suppressive gene
C. Tumor enhancing gene
D. Hair color gene

7/ A child came to the clinic with abnormal big mass in his flank area ,and he was diagnosed to have nephroblastoma ,as well as he was having WAGR syndrome. Which of the following features he might have?

A. Infertility
B. Musculoskeletal diseases
C. Hear loss
D. Parkinson disease

8/transitional cell carcinoma :

A- likley to recur after removal
B- presenting feature is hematuria
C- Associated with toxic exposures
D- all above

5-D
6-B
7-A
8-D

MCQs

9/ Schistosomiasis causes the conversion of the epithelium from?

A. Transitional to stratified columnar
B. Transitional to cuboidal
C. Squamous to Transitional
D. Transitional to simple squamous

9-D
10-C
11-A

10/ One of the risk factors for Transitional cell carcinoma is?

A. Hyperlipidemia
B. Hypolipidemia
C. Cyclophosphamide
D. Antibiotics

11/ A55-year-old man presents to his primary care physician complaining of gross hematuria and right loin pain . Physical examination revels a flank mass. The complete blood count reveals a hemoglobin level of 21 g/day and polycythemia . Ultrasound shows a 6.0-cm mass at the upper pole of the right kidney. What is the diagnosis?

A. Renal cell carcinoma
B. Transitional cell carcinoma.
C. Wilm's tumor
D. Squamous cell carcinoma.

MCQs

12/ Which tumor that could be caused by long term dialysis ?

A. Wilm's tumor.
B. Transitional cell carcinoma.
C. Squamous cell carcinoma.
D. Renal cell carcinoma.

12-D
13-D
14-D

13/ What is the most common presentation of nephroblastoma (Willm's tumor)?

A. Hematuria.
B. Hypertension.
C. Pyrexia.
D. Abdominal mass.

14/ A 3-year-old child has become more irritable over the past two months and does not want to eat much at meals. On physical examination the pediatrician notes an enlarged abdomen and can palpate a mass on the right. An abdominal CT scan reveals a 10 cm solid mass involving the right kidney. The resected mass has a microscopic appearance with sheets of small blue cells along with primitive tubular structures. The child receives chemotherapy and radiation therapy, and there is no recurrence. Which of the following neoplasms is this child most likely to have had?

A. Angiomyolipoma
B. Renal cell carcinoma
C. Urothelial carcinoma
D. Wilms tumor

MCQs

15/ Urachal Tumor is:

A. A renal tumor that arises from renal pelvis
B. A bladder tumor that arises from the urachus
C. A renal tumor that arises from the cortex of the kidney
D. A bladder tumor that arises from the muscularis propria

16/ Which type of infection can induce bladder carcinoma?

A. Schistosoma
B. Candida albicans
C. Leishmania
D. Bacterial infection

17/ From the previous question, what type of carcinoma would it be?

A. Wilm's tumors
B. Squamous cell carcinoma
C. Basal cell carcinoma
D. Renal cell carcinoma

18/ Where does Oncocytoma arise from?

A. Renal pelvis
B. Glomerulus
C. Collecting duct
D. Ureter

15-B
16-A
17-B
18-C

MCQs

19/ A patient who was 72 years old, came to the hospital because of flank pain and fever, a urine sample showed presence of RBC's (hematuria), also a palpable mass was present just below the ribs, The surgeon took the patient to the operating room and a mass was removed from the cortex of the kidney, the following characteristics were present in this mass: the kidney was in variegated appearance with a yellowish surface ,hemorrhagic and necrotic areas, present of soft cysts were seen also and the mass was dialated. What is the most likely tumor is present in this case?

A. Adenoma
B. Renal cell carcinoma
C. Oncocytoma
D. Squamous cell carcinoma

20/ In the previous question, which structure in the body must be detected from invasion by this type of tumors?

A. Brain
B. Lungs
C. Ureter
D. Renal vein

21/ Which one of these tumor is present in the center of the kidney with stellate scar formation (fibrosis)?

A. Oncocytoma
B. Renal cell carcinoma
C. Transitional cell carcinoma
D. Nephroblastoma

19-B
20-D
21-A

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