**Renal pathology** **Dr. Methaq Mueen /Lec 4**

**Tumors of the Kidney**

**Benign Tumors :**
They rarely cause clinical problems.

* Renal Papillary Adenoma
* Renal Fibroma
* Angiomyolipoma
* Oncocytoma

**Malignant Tumors :**
On the contrary to benign tumors, malignant tumors are clinically of great importance

* Clear cell renal cell carcinoma .
* Papillary renal cell carcinoma
* Chromophobe renal cell carcinoma
* Urothelial (Transitional)cell carcinoma

**Pediatric Tumors**
**Nephroblastoma (Wilm’s Tumor)**

* It is the most common primary tumor of kidney in children.
* Mostly between 2 – 5 years.
* There is no sex predilection.
* The classical clinical presentation in form of an abdominal mass, while hematuria and pain are rare.

**Morphologic features**

**Grossly:**

* Tumors are solitary, well circumscribed, rounded and soft in consistency.
* The cut section is predominantly solid and pale gray or tan and often exhibits areas of cystic change, necrosis, and hemorrhage.

**Microscopically:**

Classically tumor consists of three components (Blastemal cells, Stromal cells, & Epithelial cells).

* Blastemal cells are arranged in form of small sheets of small blue cells.
* Epithelial cells take the form of tubules, glomeruli (abortive tubules & glomeruli).
* Stromal cells showing the features of fibrocytic, myxoid, skeletal muscles differentiation.
* Some cases of Wilms tumor contain foci of squamous, mucinous epithelium, smooth muscles, fat, cartilage, osteoid tissue, & neural tissue.
* 10% of cases contain areas of **anaplasia.**

**Molecular genetic features:**

The genetic loci predisposing to nephroblastoma are:

WT1 located on 11p13.

WT2 located on 11p15.5.

**Adult Tumors :**

**Clear cell Renal Cell Carcinoma**

Tumors are derived from the **renal tubular epithelium.**

* Predominantly in the **cortex**.
* Represent 80 to 85% of all primary malignant tumors of kidney.
* Age: sixth to seventh decades
* Sex: **male**: female 2:1
* Only 1% bilateral

Epidemiology, there are many **risk factors**:
1. Tobacco is the most significant factor.
2. Obesity, particularly in women.
3. Hypertension.
4. Unopposed estrogen therapy.
5. Exposure to, asbestos, petroleum products, and heavy metals.
**Conditions that may be complicated by renal cell carcinoma are the followings;**

1. von-Hippel-Lindau (VHL) disease, renal cell carcinoma occurs in more than 50% of individuals with this syndrome.
(Autosomal dominant syndrome, abnormal VHLgene on chromosome 3.

Have CNS, retinal, liver & kidney tumors & cysts.)

2. Acquired cystic renal disease, about 50% of the patients on long-term dialysis develop renal cysts, 7% of cases are complicated by cancer.

3. Adult form of polycystic kidney disease and multicystic nephroma.

4. Tuberous sclerosis: (increase risk of angiomyolipoma, & renal cell carcinoma).

5. Neuroblastoma (treated nuroblastoma).

6. Familial cutaneous leiomyomatosis

7. Lymphoma.

**Clinical features**

It usually presents with **hematuria, flank pain or abdominal mass**. However, this diagnostic triad occurs in only 9% of the patients.

Other manifestations are weight loss, anemia, fever, and symptoms caused by metastatic deposits.

Rarely paraneoplastic manifestations may occur: Ectopic secretion of:

 Erythropoitein … polycythemia, Parathyroid-related peptide…. hypercalcemia

**Morphologic features**

**Grossly,** most renal cell carcinomas are well delineated and cortical in location. Usually the cut surface is solid golden/yellow in color.

Areas of hemorrhage, necrosis, calcification, and cystic change are common findings.

**Microscopically,**

* Mostly clear cells (lipid laden) contain lipid and glycogen , with well demarcated cell membrane, round to oval nuclei.
* Another type of cells is granular cell type with small round nuclei & pink granular cytoplasm

Other microscopic type

**Papillary renal cell carcinoma,**

* It comprises about 15% of all cases of renal cell carcinoma.
* Have papillary pattern of growth.
* Renal tumors arising in patients on chronic hemodialysis are of this type.
* Bilateral & multifocal tumors.
* Include Familial & sporadic cancers with **chromosome 7** abnormality

**Microscopically,** complex papillary formations with fibrovascular cores covered with cells have pink cytoplasm , and psammoma bodies are numerous. Stroma is heavily infiltrated by neutrophils and foamy macrophages.

As a group, papillary renal cell carcinoma has a better prognosis than conventional RCC

**3. Chromophobe renal carcinomas**

* 5% of cases of renal cell carcinoma.
* Arise from **cortical collecting ducts**.
* Have losses of entire chromosomes (1, 2, 6, 10, 13, 17 & 21).
* Chromophobe carcinoma consists of cells with clear cytoplasm & distinct cell membranes, nuclei

 Are usually surrounded by halo of cleared cytoplasm

**Spread and metastasis**

About 1/3 of renal cell carcinomas are found to invade perinephric fat and/or regional lymph nodes at the time of operation.

Renal vein invasion is seen on only 10% of cases.

Approximately 1/3 of patients with renal cell carcinoma already have distant metastases at the time they seek medical advice, lung and skeleton, being the most common sites.

Metastases can also develop in the adrenals, liver, skin, soft tissue, CNS, ovary, and almost any other site. Sometimes, these metastases develop years or decades after the removal of the primary tumor.

**Tumors of Renal Pelvis and Ureters**

**Transitional Cell Carcinoma**
Most cases occur in adults.

* There is a history of analgesic abuse and/or coexistence of renal papillary necrosis in approximately 1/4 of cases.

**Grossly,** the tumors are soft, grayish/reddish masses, often diffusely involving the entire renal pelvis and may extend to the ureters. Tumors of the ureters might be located anywhere along their length.

**Notes:**

**Clear cell** renal cell carcinoma is the most common subtype of malignant renal neoplasms(70-80%), which often involves **VHL , a tumor suppressor gene.**

 • **Papillary** renal cell carcinoma is the second most common subtype of malignant renal neoplasms(10-15%), which may involve the **MET proto-oncogene.**

• Urothelial tumors resembling similar tumors in the urinary bladder can also originate in the renal pelvis. These tumors have a poor prognosis

**Ureters:**

**Tumors And Tumor-Like Lesions of the Ureters**

Primary tumors are rare. The most common are :

1. Fibroepithelial polyps,

2. Leiomyoma.

3. Transitional cell carcinoma, are sometimes multiple and occasionally occur concurrently with similar neoplasms in the bladder or renal pelvis.

**Urinary Bladder:**

**Congenital Anomalies**

Diverticula:

They may arise as congenital defects, or acquired. In both types, the diverticulum usually consists of a round to ovoid pouch that varies in diameter (1-10cm).

Most of them are asymptomatic, but may predispose to infection and stone formation. Rarely carcinoma may arise in them.

**Bladder Exstrophy:**

 Is the presence of a developmental failure in the anterior abdominal wall (failure in the formation of anterior abdominal wall muscles) & bladder.

* Bladder either communicates to the outer surface or presented as small sac.
* Such exposed bladder mucosa is more liable to recurrent infections, ulcerations, granulation tissue formation & squamous Metaplasia.
* Such patients are at increased risk of development of adenocarcinomas of bladder.

This lesion can be corrected by surgery.

**2. Patent Urachus:**

* Urachus is connected between the bladder & umbilicus under normal condition this connection is obliterated in late infancy.
* Failure of obliteration of this connection will result in formation of Patent Urachus.

Either the **whole connection** is patent………… called **Urachus fistula**.

OR only the **central part** of connection is patent……..called **Urachus cyst.**

* These lesions are at increased risk of development of **adenocarcinoma of bladder.**

**Inflammation of Urinary Bladder (Cystitis):**

**1. Acute Cystitis:**

* More common in female especially during pregnancy.
* In male is usually secondary to obstruction (mainly BPH, Urethral stricture).
* In non obstructive cases cystitis is due to E.coli, while in obstructed cases are due to mixed organisms, staphylococci, proteus).
* If cystitis is associated with vesicoureteric reflux disease is usually extend to the upward toward the kidney.

**Mic:** Inflamed, congested, edematous mucosa of urinary bladder.

**Clinical features:** Dysuria, suprapubic pain.