Kidney tumor

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- With the current use of ultrasound and CT, most renal tumors are discovered **incidentally**, with the patient being asymptomatic

- **Signs and symptoms:**
  - hematuria
  - pain
  - flank mass
  - weight loss

- However, the classic **triad—flank pain, flank mass, and hematuria**—is present in less than 10% of renal cell cancers

- **Underlying risk factors** for renal cell carcinoma include:
  - tobacco smoking
  - von Hippel-Lindau syndrome (VHL)
  - tuberous sclerosis
  - acquired renal cystic disease from chronic renal failure
  - a number of specific genetic and familial factors

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- Most **(≈65% to 75%)** of solid renal tumors **larger than 3 cm** represent renal cell carcinomas

- **Biopsy** can be useful if there is **suspicion** that the lesion represents a metastasis from a nonrenal primary

- **Paraneoplastic syndrome**
  - Hypercalcemia,
  - Anemia,
  - Stauffer's syndrome (liver disfunction in presence of renal cell carcinoma)
  - Erythrocyte Sedimentation Rate (ESR) elevation

- **Variants of renal cell carcinoma include:**
  - clear cell,
  - papillary
  - collecting duct type
  - medullary
  - sarcomatoid

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- **Cystic renal masses** present diagnostic challenges: their risk of representing cystic malignancies must be considered

- **The Bosniak classification system** describes cystic renal masses according to their malignant risk, ranging from:
  - **Category I** (simple cysts) **to category IV** (cysts associated with enhancing or solid elements)
  - **Category III and IV cysts** are usually treated as representing cystic renal cell carcinomas

- Various **benign** renal masses are also described (**adenomas, angiomyolipomas, and oncocytomas)**

- **DIAGNOSIS: multiphase contrast-enhanced CT scan** or **MRI study**

- Also, based on clinical suspicion or abnormal laboratory studies, **bone and brain imaging** are performed

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Staging of Kidney Cancer: Primary Tumor (T)

TX: Primary tumor cannot be assessed
T0: No evidence of primary tumor
T1: Tumor ≤7 cm, limited to kidney
T2: Tumor >7 cm, limited to kidney
T3: Tumor extends into major veins, adrenal, perinephric tissue, but not beyond Gerota's fascia
T3a: Tumors with direct adrenal involvement, perinephric fat, but not beyond Gerota's fascia
T3b: Tumor extends into renal vein(s) or IVC below the diaphragm
T3c: IVC involvement above diaphragm
T4: Tumor invades beyond Gerota's fascia

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Renal cell carcinoma is primarily a surgical disease

For tumors in the **absence of metastases (or solitary metastasis) surgery is the standard approach**, with resection of solitary synchronous metastases when technically feasible

With **immunotherapy protocols** and **chemotherapeutic drugs** such as **sunitinib** (protein receptor tyrosine kinase inhibitor) for the treatment of **metastatic renal cell carcinoma**, many cancerous kidneys are currently removed (**cytoreductive nephrectomy**)

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- **The primary lesion of renal cell carcinoma may be treated with radical or partial nephrectomy**

- **Partial nephrectomy (nephron-sparing surgery)** versus radical nephrectomy: renal preservation with negative surgical magin is supported

- **Complete tumor resection** can be achieved while leaving a meaningful amount of perfused functional parenchyma with adequate collecting system drainage

- **Partial nephrectomy surgery** may be **straightforward** when dealing with a small, well-encapsulated, superficial, exophytic, polar lesion, or **complex** when dealing with larger central lesions that involve the renal hilar structures.

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- **Radical nephrectomy** is appropriate when:
  - **multiple tumors**
  - **large central tumor** not amenable to partial nephrectomy
  - when a partial nephrectomy presents an unreasonable level of risk **hemorrhage, necrosis, or loss of collecting system integrity**

- Surgery can be performed **laparoscopically or robotically**, including complex partial nephrectomy procedures and radical nephrectomies for large tumors

- **Anatomic principles of radical nephrectomy** :
  - Although a midline incision is workable for renal surgery, transverse anterior abdominal, flank, or thoracoabdominal incisions may have advantages in case of large upper pole mass adherent to upper abdominal viscera.

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- **Ligation of a renal artery must precede vein ligation** to prevent massive swelling, rupture, and dangerous bleeding from the kidney

- **The renal artery** may be approached on the **left side** by identifying and following the aorta to the point at which the **left renal vein** crosses it anteriorly; the artery typically lies posterior to the vein

- **Alternatively, the kidney, encased in Gerota's fascia, may be rotated anteriorly** and the artery may be approached and ligated from a posterior approach

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- **For renal cell carcinoma, an extra-Gerotal nephrectomy is performed**. That is, the entire perinephric fascial envelope containing the perinephric fat and tumor are excised intact

- **The ureter is ligated and divided where convenient.**

- If a negative surgical margin around the tumor can be achieved and the adjacent tissues appear benign, the **ipsilateral adrenal gland is generally spared**

- **Bulky tumors:** adequate radical nephrectomy may require splenectomy, distal pancreatectomy, partial resection of the colon and/or mesentery, and resection of flank musculature.

- **On the right side**, segmental or wedge resection of the liver, duodenum, colon, or other adjacent structures may be necessary

- A regional lymph node dissection is often performed with a radical nephrectomy for staging purposes

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- **If a renal vein or vena caval tumor thrombus is present**: obtain complete proximal and distal control of the vena cava and all major collaterals and being prepared to massive transfusions. **If the thrombus extends** above the diaphragm or into the right atrium, cardiopulmonary bypass has to be considered

- In case of **macroscopic lymph node involvement, distant metastases, and/or cytoreductive nephrectomy**, just to remove the involved kidney

- **When dealing with bilateral renal cell carcinomas:** the surgeon will deal with the larger and more challenging kidney initially and then proceed with the contralateral resection if the procedure is progressing well and the patient can tolerate the additional surgery at the same setting. Possible two staged procedure. Consider partial nephrectomy.

- **For partial nephrectomy**, a negative margin should be obtained with the parenchymal resection: only a few millimeters of normal parenchyma around the tumor is often considered necessary

- **The general principles for partial nephrectomy**: negative surgical margin, identification and suturing of significant segmental renal vessel branches, and collecting system repair when the collecting system is entered and/or partially resected

- **Regional hypothermia** with atraumatic vascular clamping of the renal artery and surface cooling of the kidney with iced saline slush can be useful in partial nephrectomy

- **Tissue sealants, hemostatic agents, and absorbable mesh** reconstruction of the kidney are all useful techniques to aid in the completion of a partial nephrectomy in the open surgical, laparoscopic, or robotic setting