* GU CASES

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Done by
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TO all my love brothers and sisters

* In this file I used the outlines from the doctors slides and used my (and also my friends) personal notes and text books to try to cover the subjects as good as possible .

* Sorry I don't hold responsibility for any missing information or perhaps – I say perhaps – wrong material. ***I swear the Gad*** that I tried my best to present this lecture in the best way and I hope that what I wrote in enough to cover the subject .

* شكرا خاص للدكتور محمد الشرقاوي على مساعدته لي .. ومراجعته واعتماده للنوتات .

اخوكم .. عبد العزيز السعد ☺ dr.zee zu
(rad Gp)

* Nephrolithiasis

- Epidemiology :
  - ☞ Up to 10% by age 70, usually in 3rd to 4th decade
  - ☞ 4:1 M to F ratio
  - ☞ More prevalent in the South

- Risk Factors
  - ☞ Hypercalcemic states, Crohn's, stents, RTA, infection, gout, hypercalciuria, hyperuricosuria, cystinuria

- Symptoms
  - ☞ Asymptomatic, flank pain, hematuria

- Composition

1) OPAQUE contains calcium +/ phosphate
   - ☞ Calcium calculi
   - ☞ Ca oxalate, Ca phosphate
   - ☞ ***Struvite*** calculi
   - ☞ Magnesium ammonium phosphate= triple phosphate

2) SEMI OPAQUE contains sulphur
   - ☞ ***Cystine*** calculi

3) LUCENT
   - ☞ ***Uric acid stones;Xanthine***
   - ☞ Matrix (coagulated mucoid material)

Note

Remember that :
Lucent & semi opaque stone we can't see on plain film but we can see it in CT without I.V contrast .

* CT Imaging of Stones

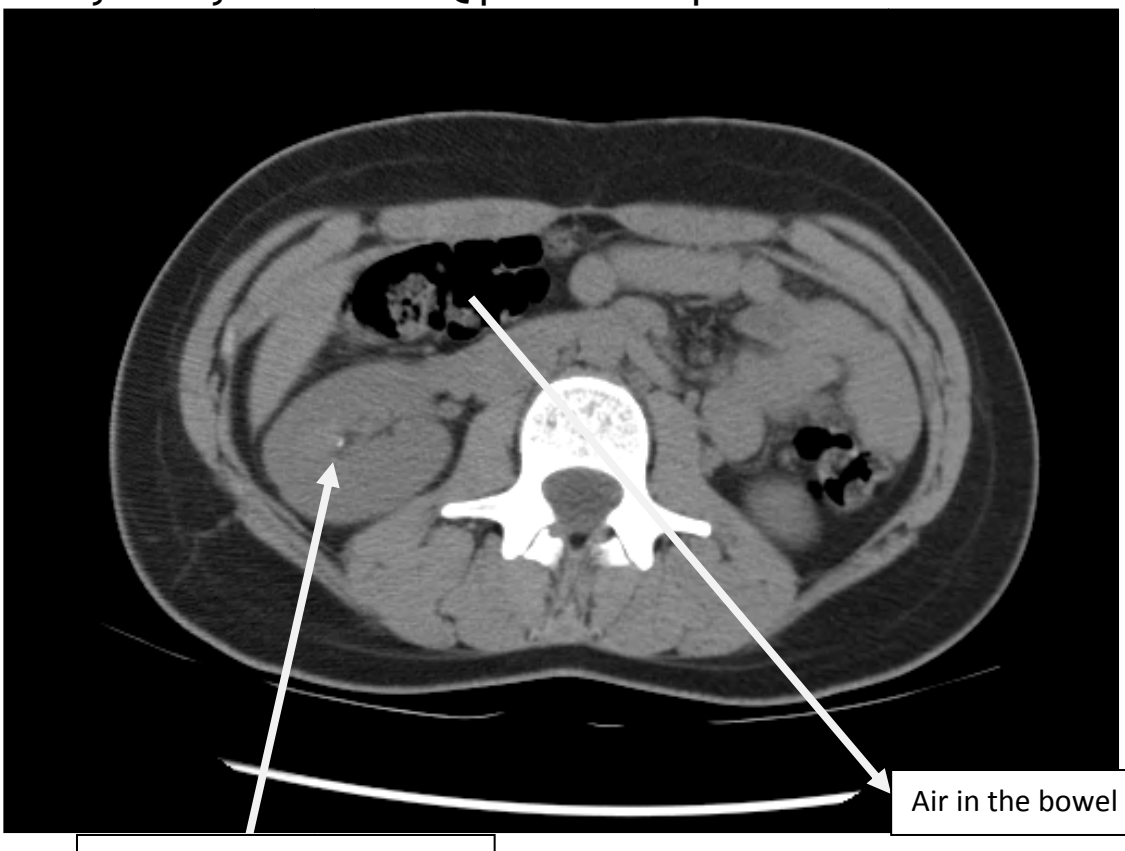
- *Essentially all renal and ureteral calculi have high attenuation on non-contrast CT* (all but matrix stones have attenuation of > 100HU) .
- CT has sensitivity of 97% and specificity of 96% .
- Can also see hydronephrosis, hydroureter, renal enlargement, or perirenal stranding .
- Must differentiate from phlebolith which is a calcified blood clot in a pelvic vein.(appearance: round/ovoid, smooth, central lucency, in true pelvis)

Note

In x-ray we see only radioopaque stone but here in C.T we can see radioopaque & radiolucent stone and also it's effect e.g. hydronephrosis .

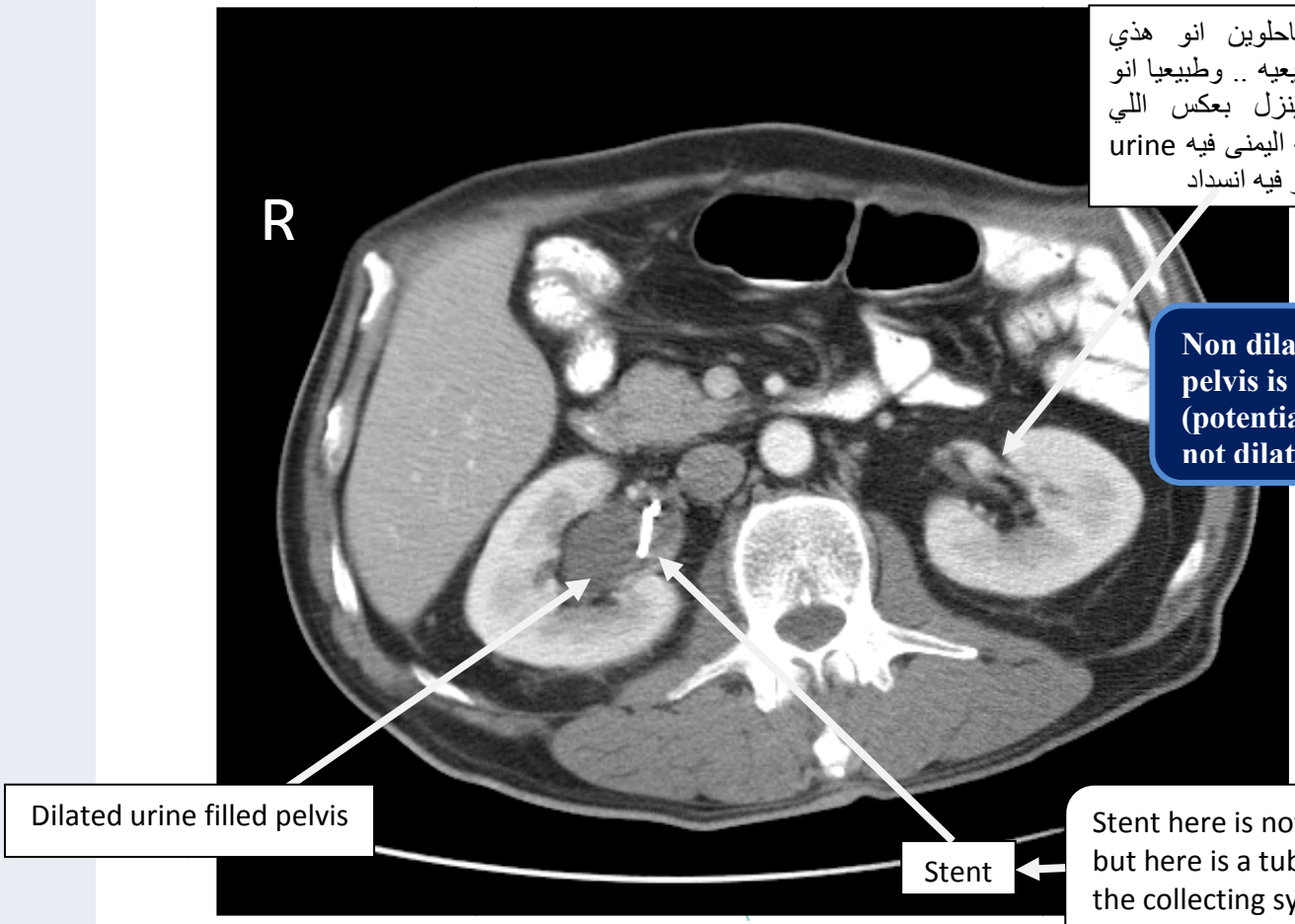
Nephrolithiasis

History : 23 y.o F w/ RUQ pain/flank pain

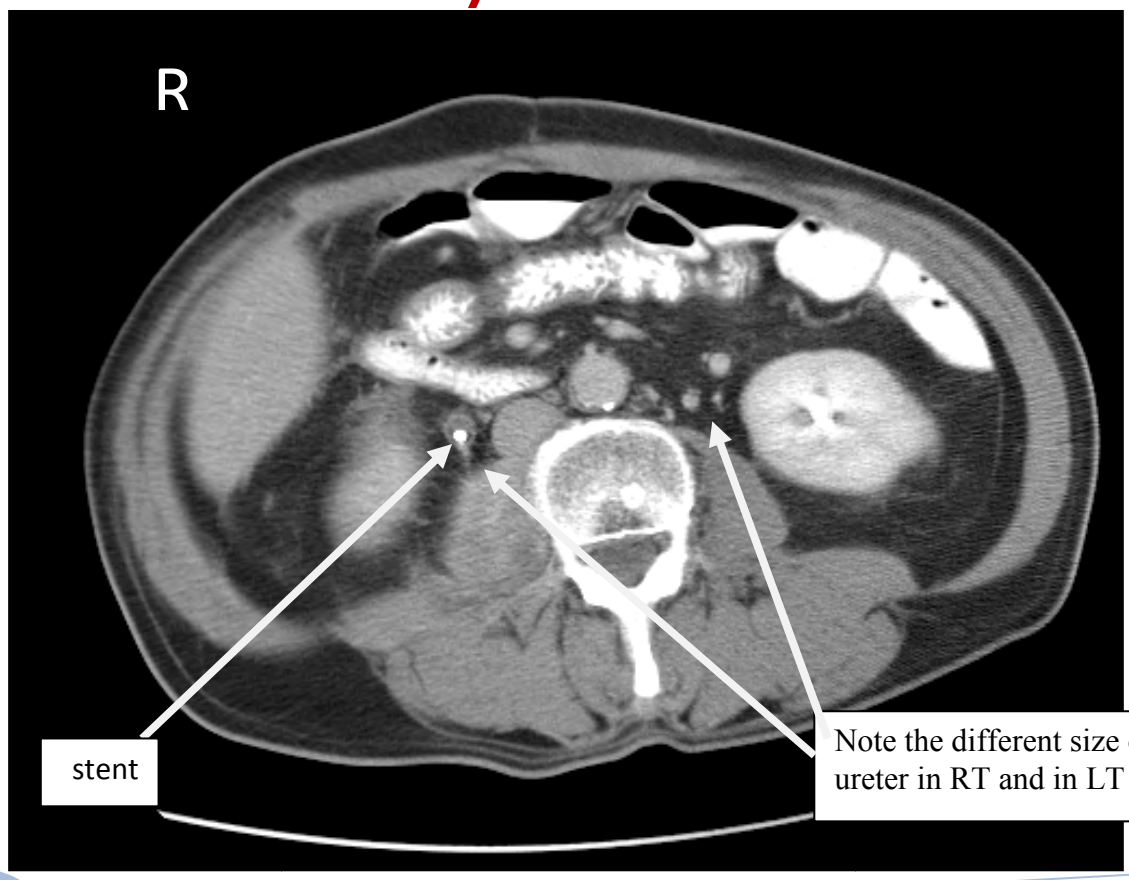


Hydronephrosis

History: Older h/o met colon ca→ R psoas mass causing obstruction S/p



Hydroureter



* Renal Cystic Disease

- Very common→ 50% of pts over age of 50 .
- Associated with many syndromes, etiology unknown, probably arise from obstructed tubules or ducts
- Most commonly asymptomatic .
- Rarely, may have *hematuria*(it may happen with malignancy and also may be come with stone renal polycystic) , HTN, cyst infection, or mass effect .

Note

When you see a hypodense structure with thin regular impercibtable walls inside renal parenchyma full of fluids it's a renal cyst .

* CT Characteristics of Simple Cysts

- Smooth, imperceptible cyst wall .
- Sharp demarcation from surrounding renal parenchyma.
- Water attenuation (<15 HU)☝, homogenous throughout lesion .
- Non-enhancing .
- Simple cysts are w/o septations or calcification .(not show soft tissue component)
- May have slight elevation of adjacent renal parenchyma → Beak sign .

Note

Attenuation value inside the cyst should be fluid ,maximum 15 HU and when it's clear fluid it's near zero and when it become more turbid like urine, pus, blood it's goes away from 15 HU and become more dense
HU = Hounsfield unit = it's measure the density on CT >>And it's scale is :
*** < 0 = -ve = fat or air (-100 Hu fat , -1000 Hu air) ☝**
0 < * = +ve = fluid ..and the soft tissue become more dense
0 ➔ +15 = water attenuation
+100➔+1000 = calcification

*Complex Cysts:

Categorized using the Bosniak Classification

Categories based on imaging features that are intended to serve as guideline for estimating likelihood of malignancy :

Type I- ***simple cyst***

Type II- mildly complicated cyst→ mild Ca2+ (calcification) , thin septations, no enhancement

IIF- slightly more complex type II lesions

Type III- complex cysts→ thick wall; multiple, irreg, thick septations/calcifications, no enhancement

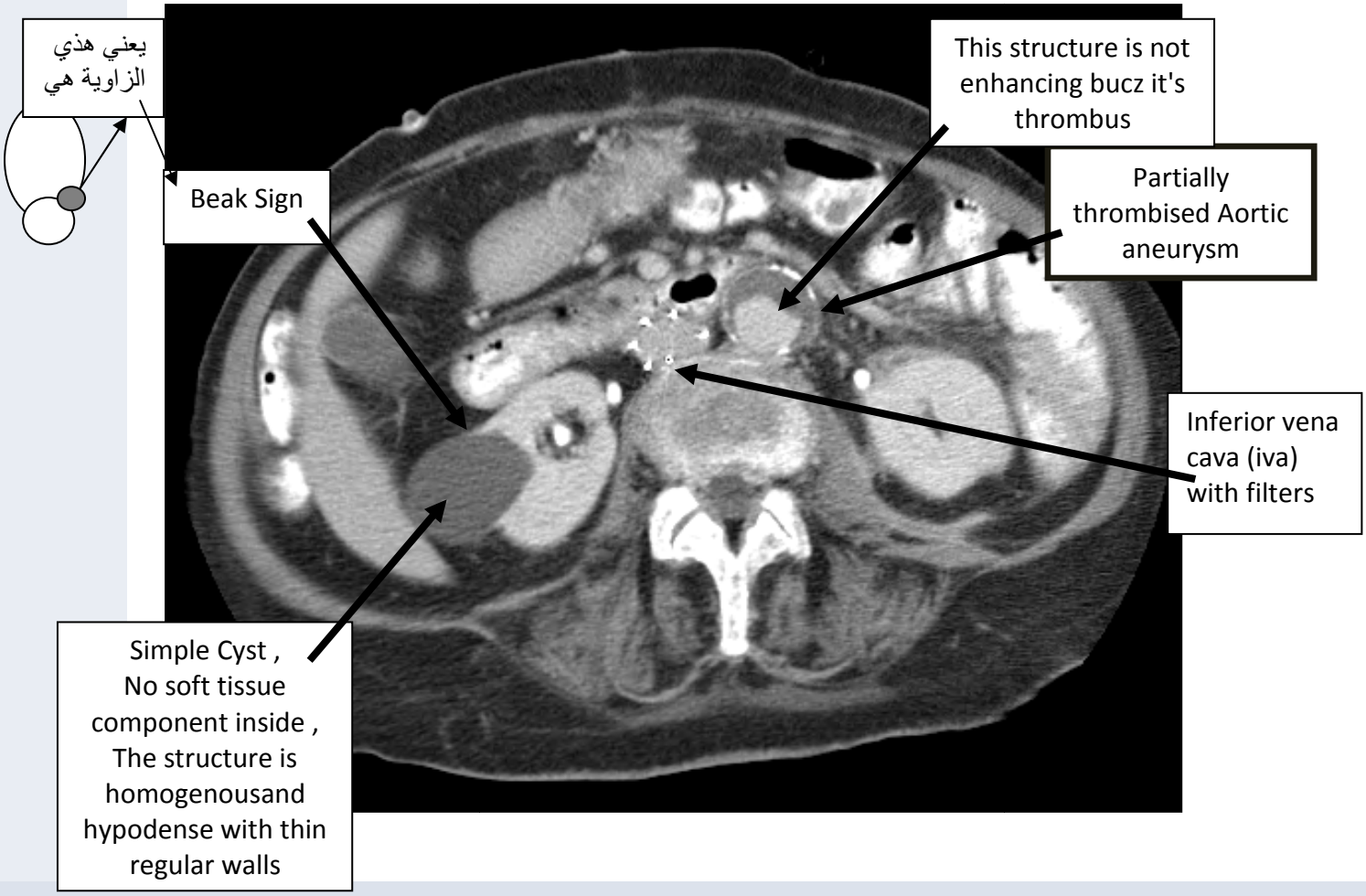
Type IV- ***cystic neoplasm→ enhancing wall or solid component***

F=follow up (يعني النوع اللي يحتاج فيه متابعة)

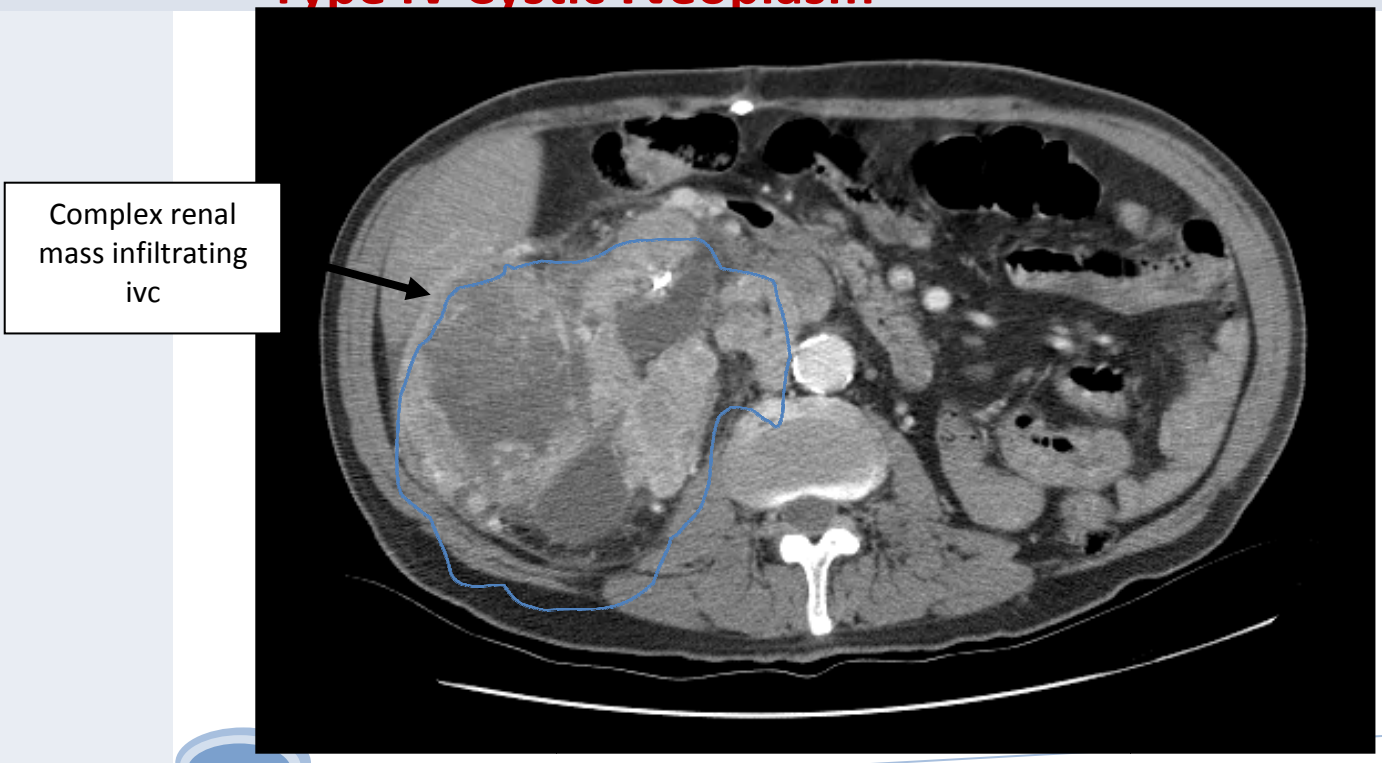
*Treatment ☒ للفائدة

- ☞ **Type I - no follow up required**
- ☞ **Type II - no f/u required . but خلك حذر**
- ☞ **Type IIF - f/u CT after 3-6 months**
- ☞ **Type III - Excision**
- ☞ **Type IV - Excision**

* Type I Simple Cyst



* Type IV Cystic Neoplasm



* Conditions Associated with Multiple Cysts

- ✓ Autosomal Dominant polycystic kidney disease (PCKD)
- ✓ Autosomal Recessive PCKD
- ✓ Acquired Cystic Disease (hemodialysis pts)
- ✓ Von-Hippel-Lindau disease
- ✓ Tuberous Sclerosis the most common in conditions associated ..
- ✓ Medullary Sponge Kidney

Tuberous sclerosis→ tubers=mental seizure, retardation, renal AMLs
VHL dis→ cns hemangioblastomas, abd visceral cysts

الى الان انتم مركزين والا لا

* There are two type of masses : benign or **Malignant**

* Benign Masses

- **Cysts ++**
- **Angiomyolipoma ++** (it's contain vessels , muscular tissue ,fatty tissue)
- **Oncocytoma (via epithelial cells of prox tubule)**
- **Renal Adenoma**
- **Mesoblastic Nephroma (hamartomatous tumor, usu present at birth)**
- **Hemangioma**
- **Various Renal Pelvic Tumors(papilloma, angioma, fibroma)**
- **Hematoma**

Oncocytomas and renal adenomas are very difficult to distinguish from RCC thus they are generally excised

* Angiomyolipoma

- Hamartomas containing fat, smooth muscle, and blood vessels
- Usually asymptomatic, but may spontaneously bleed
- Large AMLs resected or embolized
- Multiple AMLS usually Associated w/ tuberous sclerosis
- On CT→ *fat attenuation in mass*, strong contrast enhancement (RCCs rarely contain fat), no Ca2+

* Malignant Masses

- ☞ Renal Cell Cancer
- ☞ **Transitional Cell Cancer**
- ☞ **Wilm's Tumor**
- ☞ **Nephroblastomatosis (multiple rests of embryologic metanephric blastoma)**
- ☞ **Lymphoma**
- ☞ **Metastases (lung, breast, colon, melanoma)**

* Renal Cell Ca (RCC)

- Most common primary renal malignancy (85% of primary renal tumors)
- Assoc w/ smoking, family hx, age, Von Hippel-Lindau, Acquired Cystic Disease/chronic dialysis, phenacetin abuse
- Presentation: Hematuria, flank pain, wt loss, palp mass, fever, anemia, paraneoplastic syndromes
- ↑ liver enzymes with metastasis

يعني if the pt. come with elevated liver enzymes you should think about mets and u do CT for liver

* CT characteristics

- ☞ Variable→from complex cyst to large, heterogeneous renal mass
- ☞ Generally enhancing with irregular wall
- ☞ May have calcifications
- ☞ May have hemorrhage and central necrosis
- ☞ Usually no fat

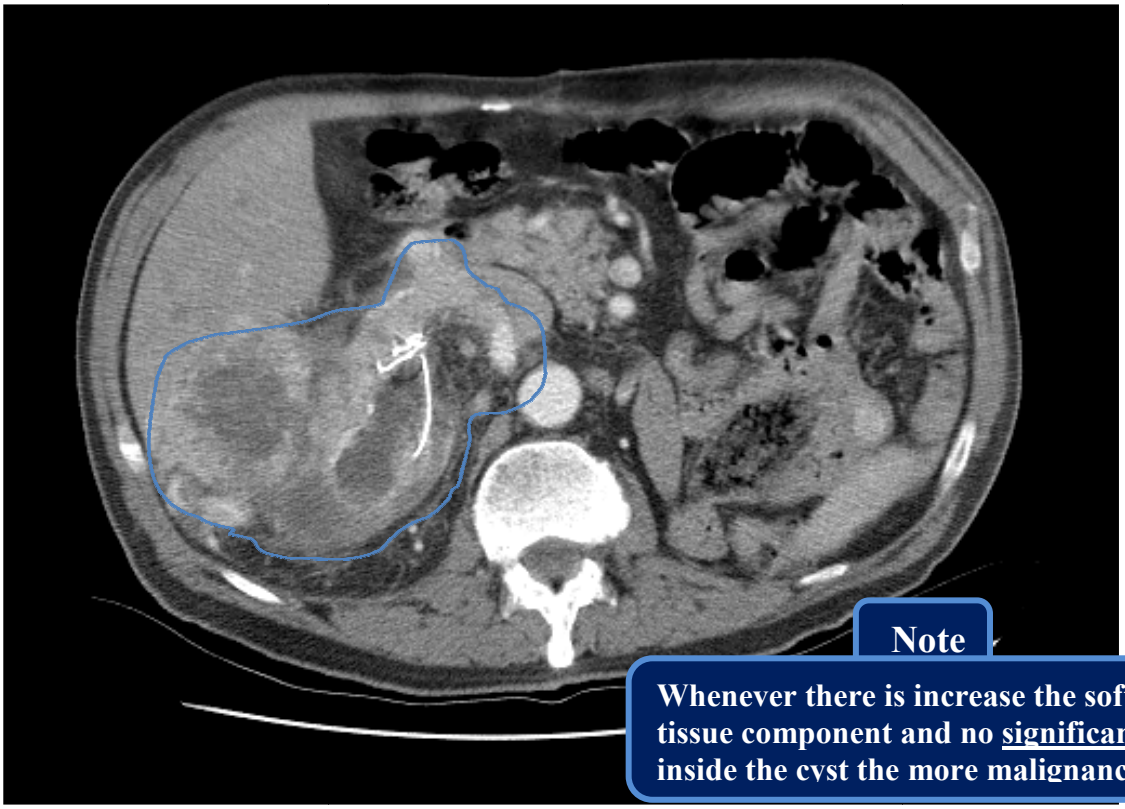
You must know the exteion of tumor preoperatively and if there affection of renal vein

Robson Staging ☒ للفائدة يا قميل

- **Stage I – contained w/in renal capsule**
- **Stage II – contained w/in Gerota's fascia**
- **Stage III**
  - **A – venous invasion (renal v, IVC)**
  - **B – lymphatic invasion**
  - **C – both**
- **Stage IV – distant metastasis (lungs, liver, lytic bone, adrenal, contra renal**

Tx→ radical nephrectomy, chemo, and palliative radiation
5 yr Prognosis: Stg 1,2 = 50%, Stg 3 = 35%, Stg 4 = 15%

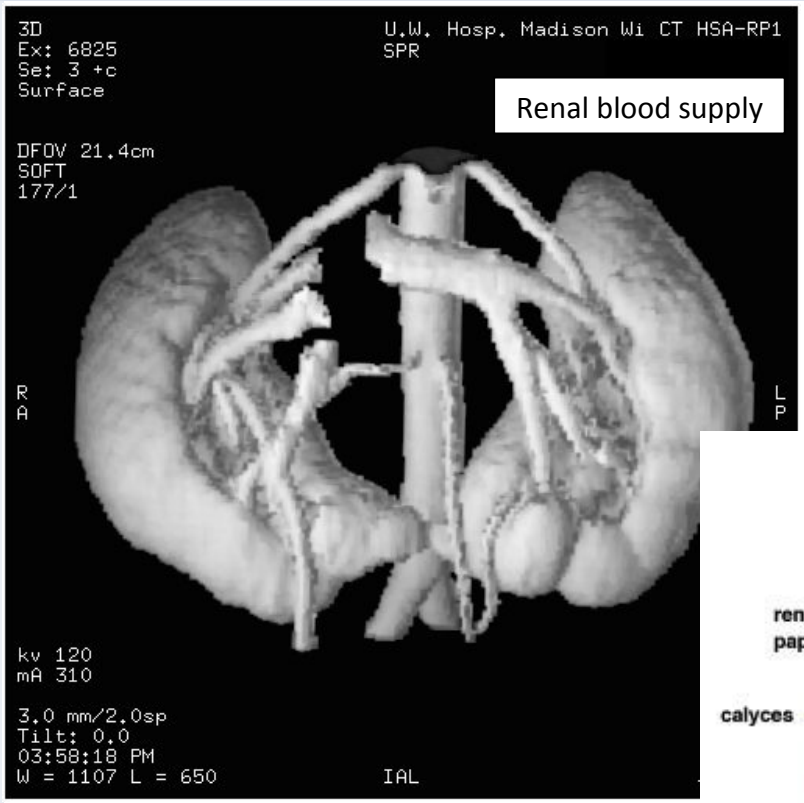
* Renal Cell Ca (Type IV Cystic Neoplasm)



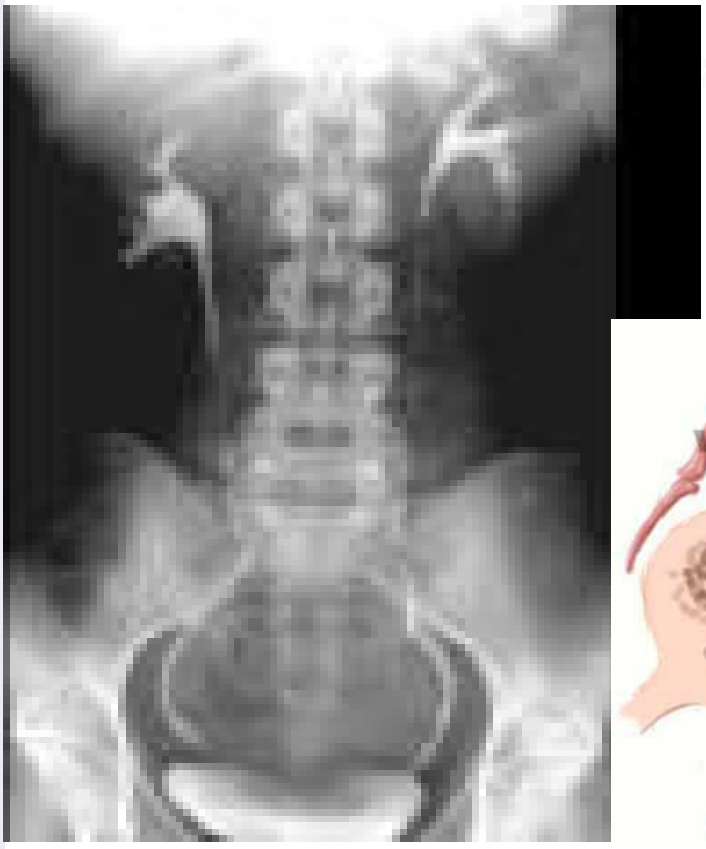
RCC

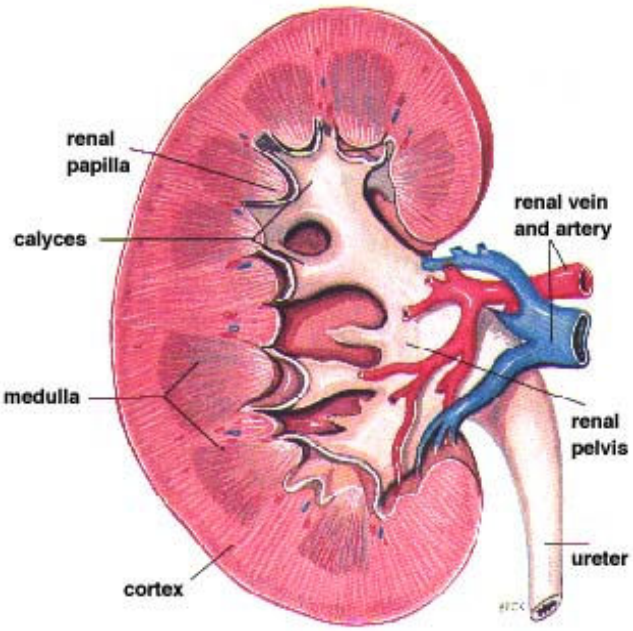
* Renal Trauma

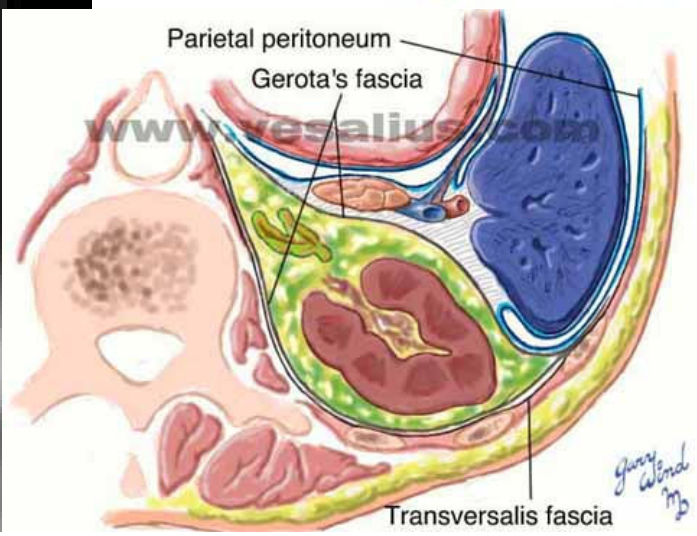
Anatomy of the Kidney



Be suspicious of renal injury with broken ribs







* Prevalence of Renal Trauma

- ☞ 10-20% of trauma pts. have GU involvement
- ☞ 45% of GU trauma is renal
- ☞ 20-30% of renal trauma pts. have associated abdominal injury

* Mechanisms of Renal Trauma

- ✓ Blunt trauma (80%): MVA (car) , falls, assaults
- ✓ Penetrating trauma (20%): gunshot, stabbing, impalement
- ✓ Predisposing factors: preexisting renal conditions (tumors, hydronephrosis), children, associated abdominal injuries

* Clinical Presentation of Renal Trauma

- ✓ Gross or microscopic hematuria (absent in 5%)
- ✓ Flank pain/ecchymosis
- ✓ Hemodynamic instability
- ✓ Presence of other abdominal injuries

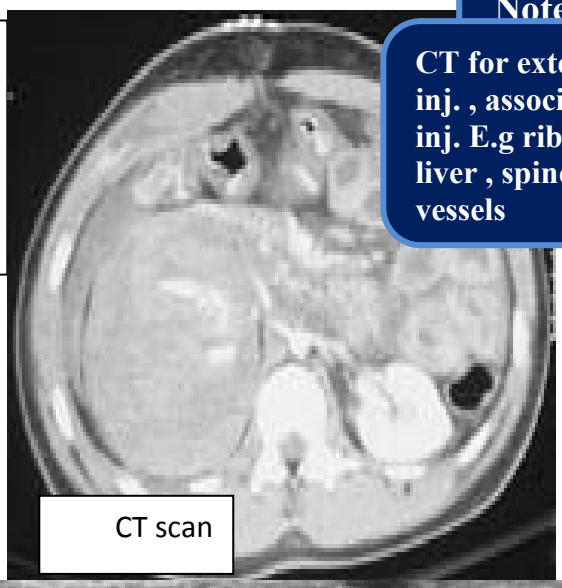
* Patient 1: An illustration of imaging modalities

- 18 yo male sustained stab wound to R flank
- P=180, BP 130/80, Hct 36
- CXR normal.
- Why image and with which modality?

مشان نشوف ازا فيه اصابات للاعضاء القريبة من الكلية وبرضو
مشان نشوف ازا فيه نزيف وافضل شيء هو السي تي سكان

Note

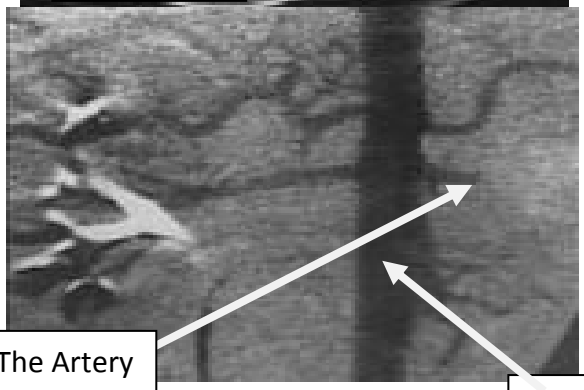
CT for extent of inj. , associated inj. E.g ribs , liver , spine and vessels



CT scan

Today it doesn't have a good rule in this situation

IVP



The Artery is cut

angiogragy

aorta

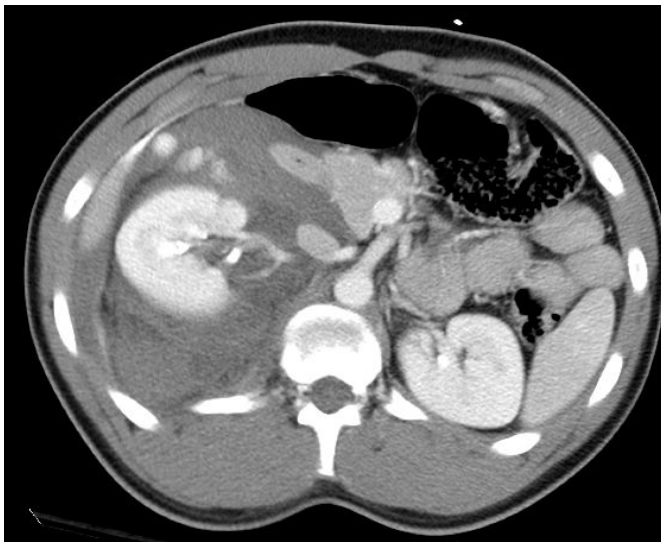
* Indications for Imaging

- Gross hematuria
- Microscopic hematuria with hemodynamic instability
- Persistent microscopic hematuria

* Radiologic Imaging of Renal Trauma

CT with IV contrast

- Gold standard, high sensitivity
- Immediate and delayed post-contrast images to view collecting system
- Allows diagnosis and staging
- Images abdomen and retroperitoneum
- Not for hemodynamically unstable pts.



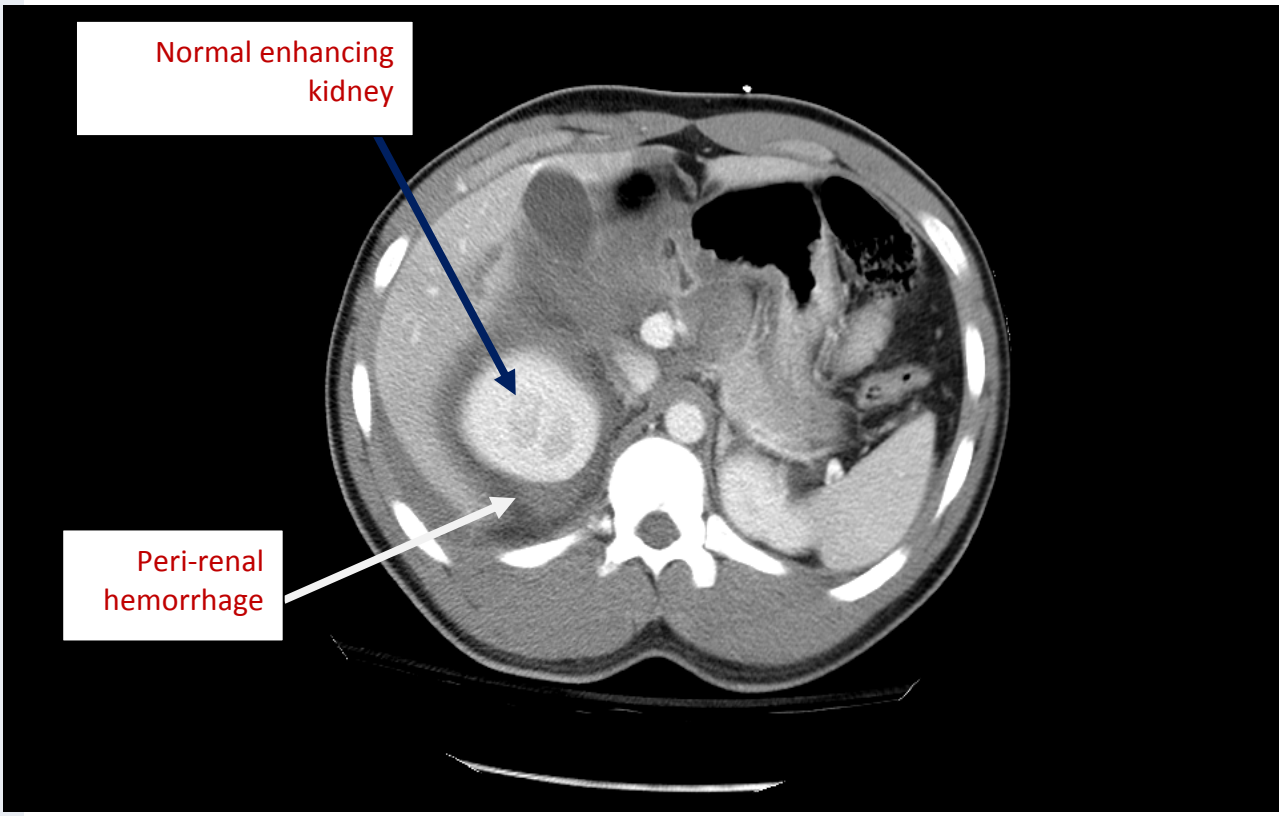
Note

The best modality for assessment of renal trauma is CT , US is not accurate ,and may miss a lot of injuries but may be the 1st Ix to use (fast, cheap , available) .

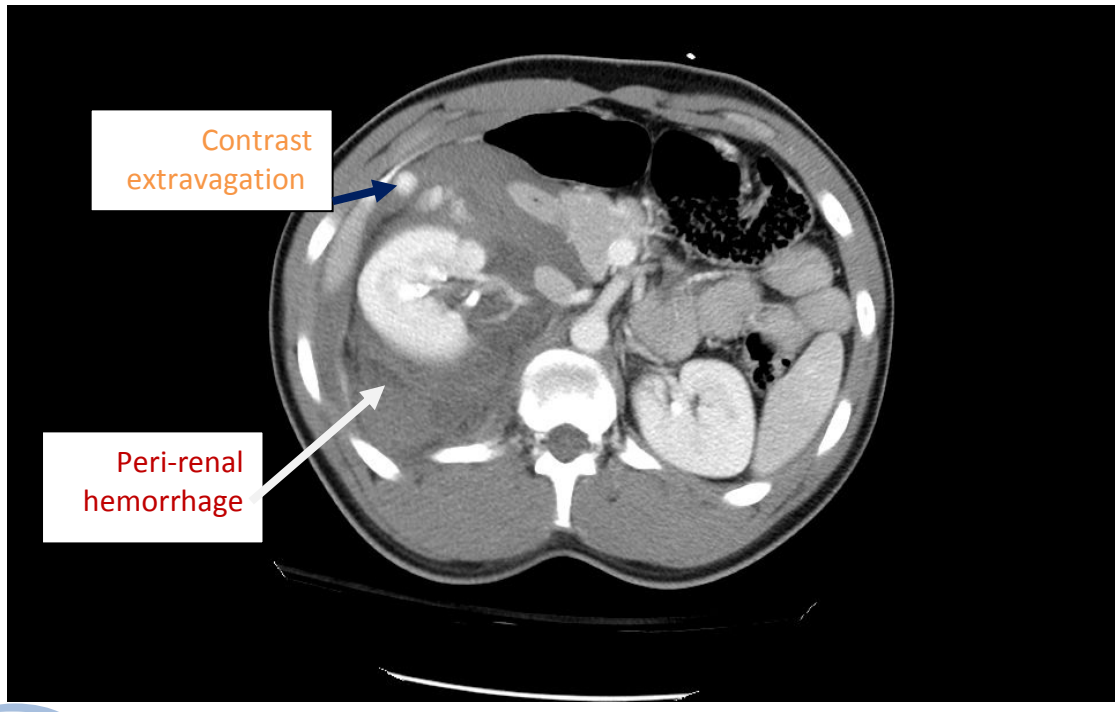
Note

The effect of trauma to kidney is :
1- part or the hole of kidney is cut (parenchymal laceration).
2- renal hiluim cut and is two type either vesicular or collecting system >>> and whenever artery or vein is cut the kidney well not furcating and when renal pelvis is cut there well be contrast extravasations .

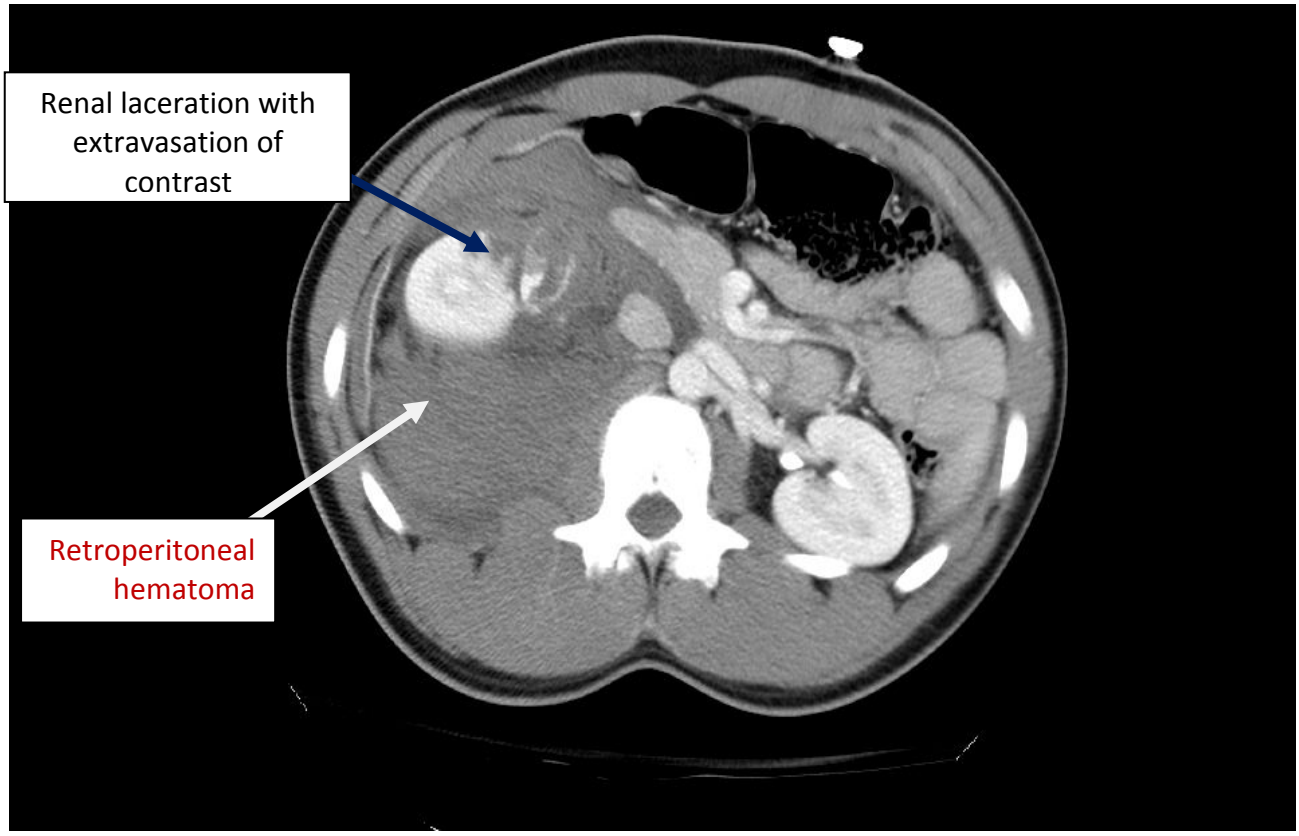
Patient 1: CT with IV contrast



Patient 1: CT with IV contrast



Patient 1: CT with IV contrast



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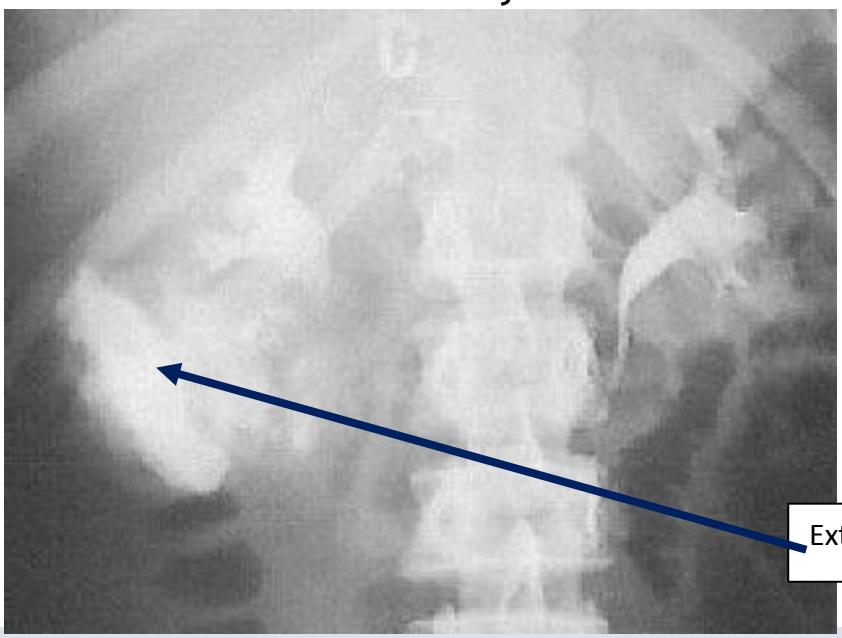
* Radiologic Imaging of Renal Trauma Cont.

Intravenous pyelography

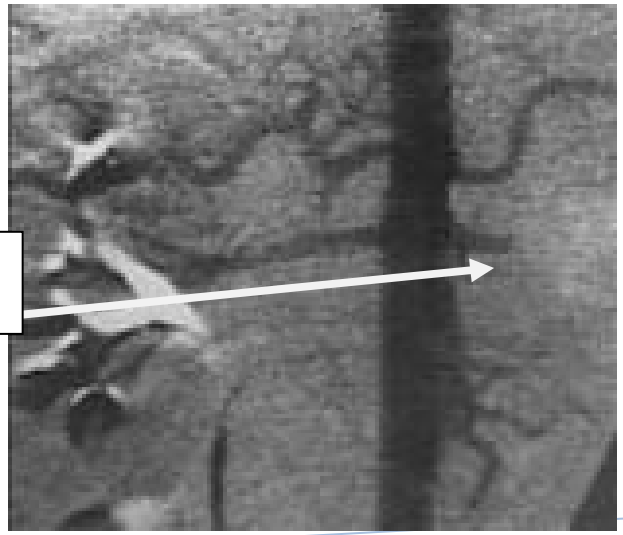
- Unable to evaluate abdomen and retroperitoneum
- Inadequate for grading renal injury
- Used in unstable pts prior to surgery to identify functioning contralateral kidney



* Radiologic Imaging of Renal Trauma Cont.

Renal Angiography

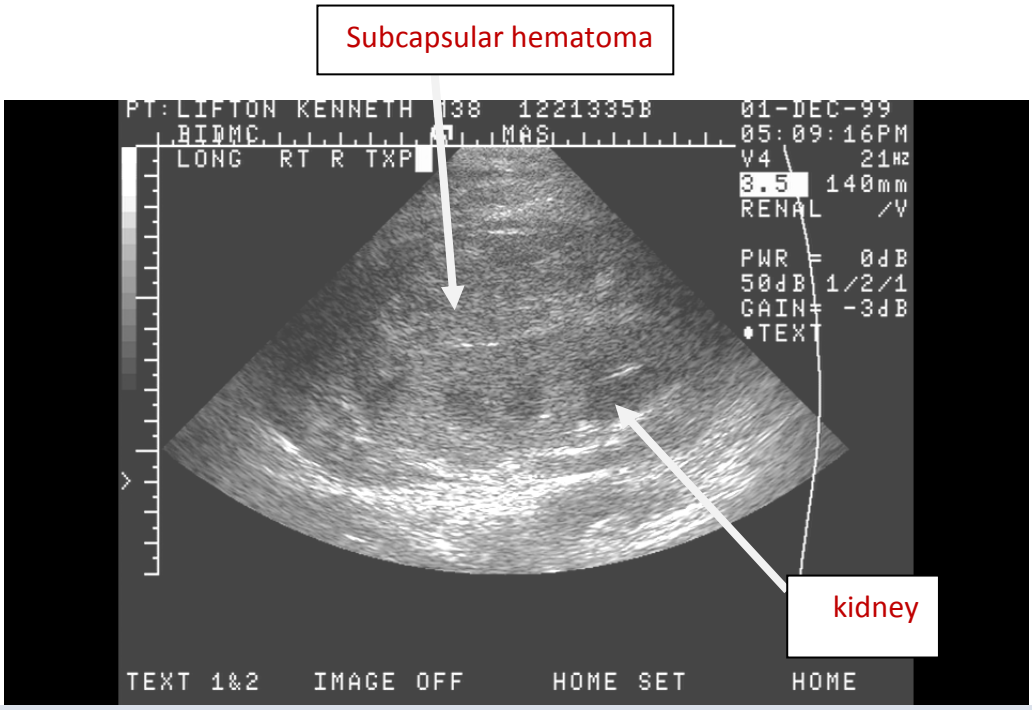
- Delineates vascular injury (intimal tears, pseudoaneurysm, AV fistula)
- Use when CT equivocal and continued hemorrhage
- Use for endovascular repair (embolization, stenting)



Radiologic Imaging of Renal Trauma Cont.

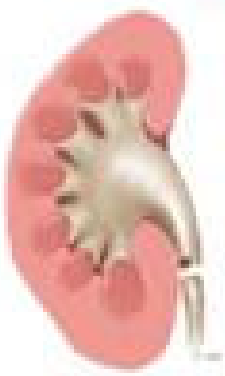
* Renal ultrasound

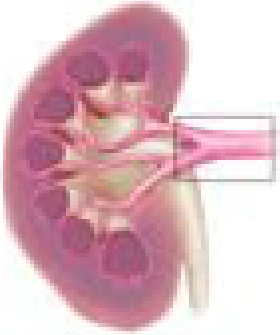
- Bedside US in ED allows evaluation of abd/pelvic injury/fluid accumulation
- High false neg. rate for renal injury
- Used in areas without CT, or for follow up

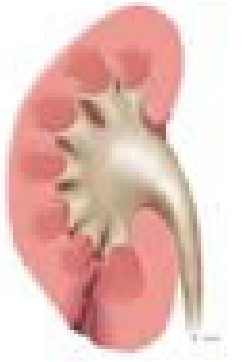


Patient 2: An Illustration of Injury Staging

- 17 yo unrestrained driver MVA compiling of RLQ pain
- Hct 45.7, BUN 15, Cr 1.2
- CXR, cervical, lumbar, pelvic plain films nl.
- CT demonstrates renal laceration
- How severe? How to manage?





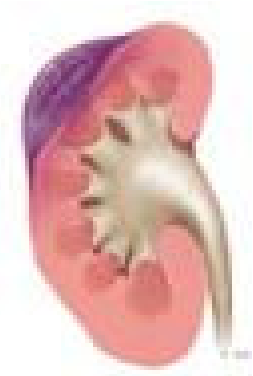


* AAST Organ Injury Scale - Renal Injury

Grade I

Contusion: Microscopic or gross hematuria, urological studies normal

Hematoma: Subcapsular, nonexpanding without parenchymal laceration



Grade II

Hematoma: Nonexpanding perirenal hematoma confined to renal retroperitoneum

Laceration: <1cm parenchymal depth of renal cortex without urinary extravasation

Grade I and II injuries managed conservatively (observation, serial Hct)

* AAST Renal Injury Scale Cont.

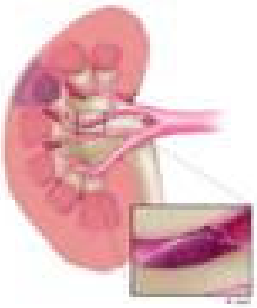
Grade III

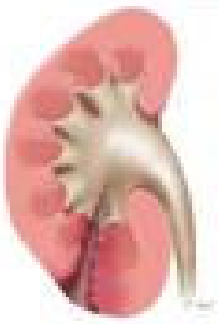
Laceration: >1cm depth of renal cortex, without collecting system rupture or urinary extravasation

Grade IV

Laceration: Parenchymal laceration extending through the renal cortex, medulla and collecting system

Vascular: Main renal artery or vein injury with contained hemorrhage



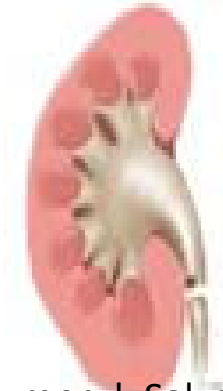


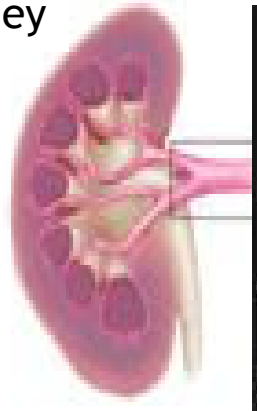
grade III and IV injuries are now managed conservatively

Grade V

Laceration: Completely shattered kidney

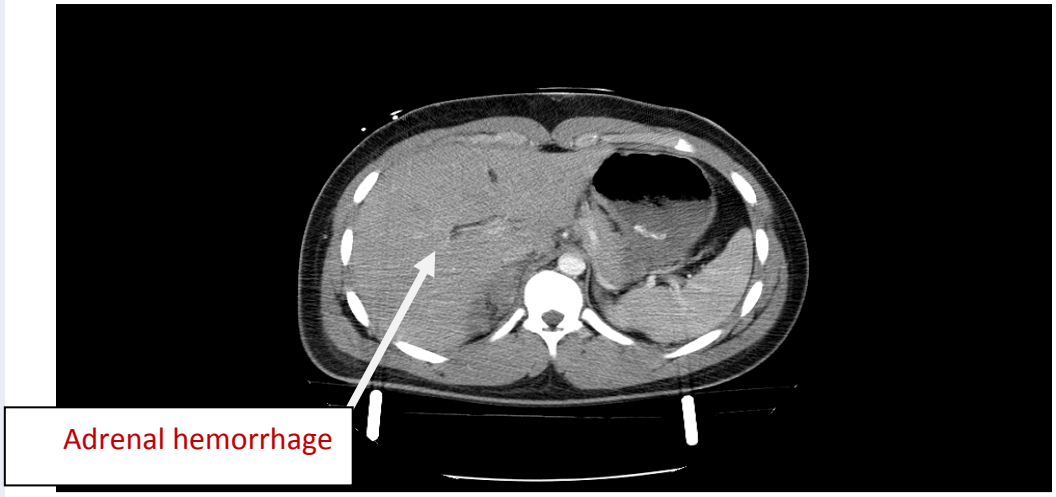
Vascular: Avulsion of renal hilum which devascularizes kidney





Surgery! Salvage vs. nephrectomy

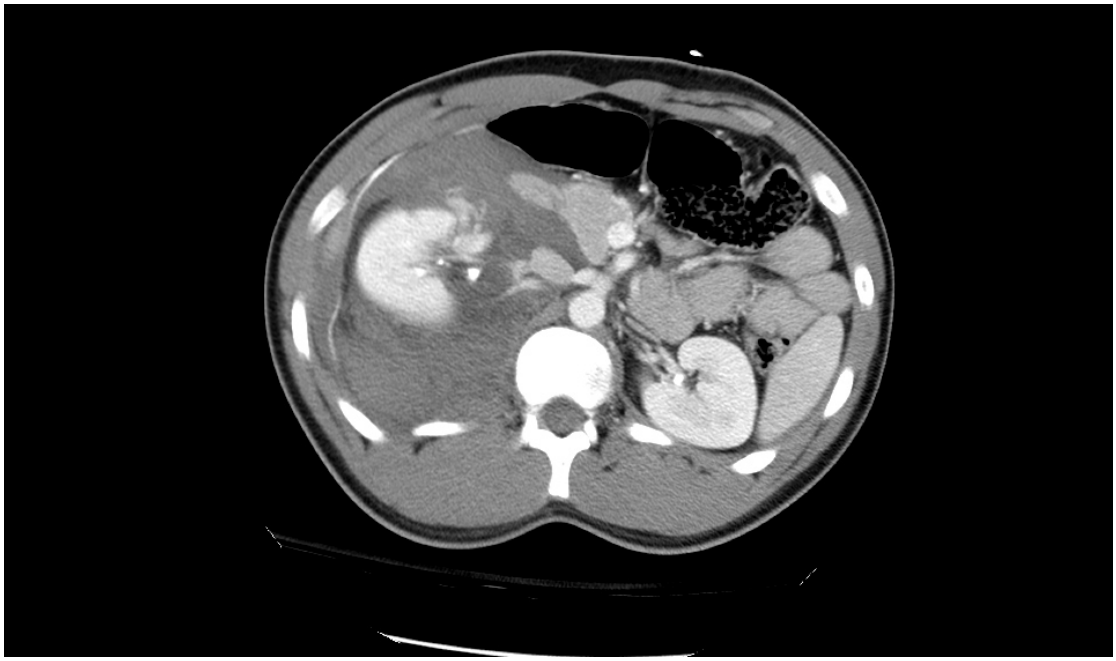
* Patient 2: Grading the Renal Injury



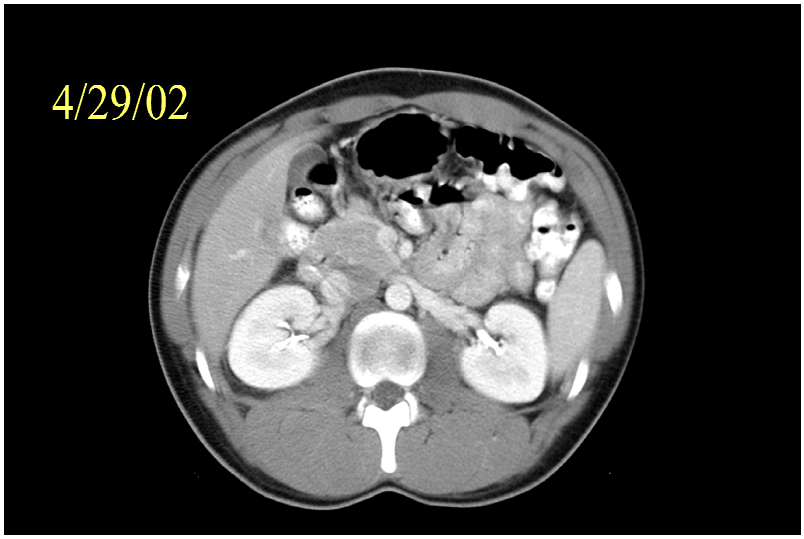
- Laceration renal cortex >1cm
- No involvement of collecting system or hilar vasculature
- Grade III
- Conservative management

* Patient 1: Grading/Management

- Laceration of renal cortex extending into collection system
- Large perirenal and retroperitoneal hemorrhage
- Grade IV



Conservative management with resolution in 2 mo



* Renal Trauma Conclusions

- Look for renal trauma in pts with abdominal trauma and significant MOI
- CT with contrast
- Grade severity of injury
- Injuries requiring surgery: vascular injury, shattered kidney, expanding hematoma
- 80-90% renal injuries treated conservatively with remarkable resolution!

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24

Done yahlween

Abdualziz Alsaad