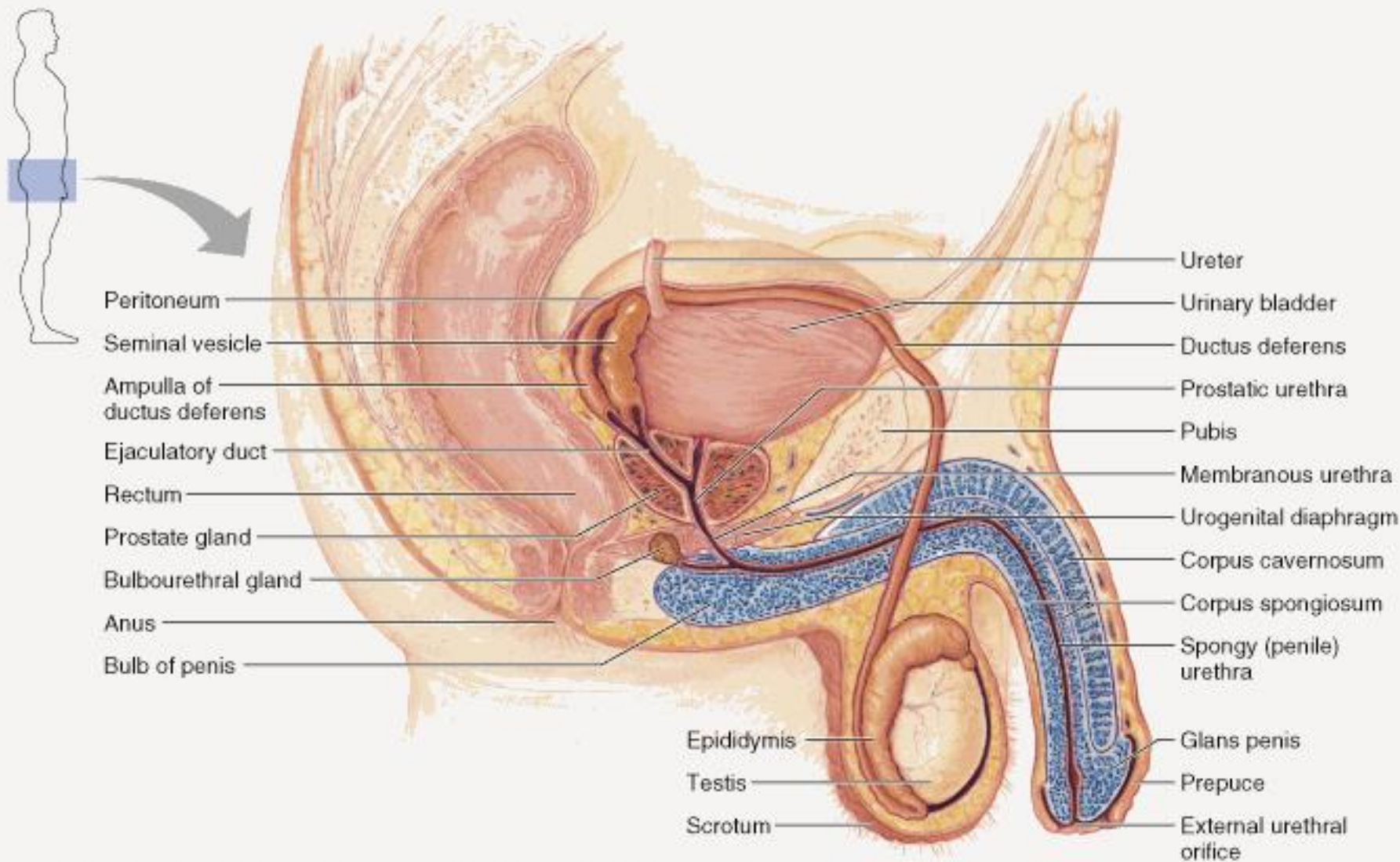


GU Recalls

1997-2008

2008



- Intraperitoneal calcifications seen on prenatal ultrasound. Which of the following is likely?
 - CF
 - Bowel perforation

- Which of the following are worrisome for malignancy in renal tumors:
 - A) Enhancement
 - B) Septations
 - C) Calcifications

- Which of the following is false regarding paraovarian cysts?

Ovarian torsion

Exhibit cyclic changes

Located in the broad ligament

Can look like functional cysts

See Dunnick pg 428

- Seminal vesicle cyst is associated with which of the following?

Renal ectopia

Renal agenesis

Ureteral duplication

- 65 yo man presents with painless mass in the scrotum. On ultrasound there was a hypoechoic mass involving the testicle and epididymis. Most likely etiology:

Seminoma

Germ cell tumor

Infection

Lymphoma

2008

- What size would you expect a follicle to rupture?
 - A) 1cm
 - B) 2cm
 - C) 3cm
 - D) 4cm

2008

- b. The dominant follicle is up to 25 mm, multiple recalls give 20 mm as the answer also.
- Brant ultrasound.

2008

- Which stone is most likely to be low density on CT (radiolucent)?
 - A) cystine
 - B) struvite
 - C) oxalate
 - D) xanthine
- Duke Version- Least dense stone (recall)?
 - A) Uric Acid
 - B) Xanthine
 - C) Matrix
 - D) Struvite

2008

- Which stone is most likely to be low density on CT (radiolucent)?
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From AFIP Textbook

TABLE I Attenuation Values for Human Kidney Stones Determined by Helical CT In Vitro							
Stone Composition	n	Mean Attenuation (H) for Region of Interest at Collimation of			Maximum Attenuation (H) Within Region of Interest at Collimation of		
		1 mm	3 mm	10 mm	1 mm	3 mm	10 mm
Uric acid	22	567 ± 40	415 ± 29	136 ± 19	650 ± 47	483 ± 35	158 ± 21
Cystine	27	860 ± 26	668 ± 38	232 ± 31	984 ± 36	770 ± 43	269 ± 35
Struvite	14	1087 ± 100	919 ± 72	454 ± 63	1248 ± 118	1063 ± 87	524 ± 72
Calcium oxalate	34	1639 ± 25	1249 ± 45	484 ± 60	1862 ± 26	1437 ± 49	542 ± 69
Brushite	14	1913 ± 43	1383 ± 121	648 ± 149	2155 ± 34	1584 ± 130	749 ± 172
Hydroxyapatite	16	2069 ± 33	1525 ± 99	406 ± 64	2361 ± 36	1771 ± 106	473 ± 74

Least Dense

Uric Acid

Cystine

Struvite

Calcium Oxalate

Brushite

Hydroxyapatite

Most Dense

	Mineral Composition	Opacity
Calcium stones		
	Calcium oxalate	+++
	Calcium phosphate	+++
	Calcium hydrogen phosphate	+++
Struvite	Magnesium ammonium phosphate	—
Triple phosphate		++
Cystine		+
Uric acid		—
Xanthine		—
Matrix		—

2008

- Which stone is most likely to be low density on CT (radiolucent)?
 - A) cystine
 - B) struvite
 - C) oxalate
 - D) xanthine

2008

- Which stone is most likely to be low density on CT (radiolucent)?
 - A) cystine- density depends on Ca but usually dense enough to be easily seen on abdominal Xray
 - B) struvite- (magnesium ammonium phosphate), form when urine pH is more than 7.2, commonly occur with UTI and a urea splitting gram negative enteric organism (*Proteus mirabilis*). Pure struvite stones are essentially radiolucent and rare. Typically they are found mixed with Calcium Phosphate and are easily seen on plain radiographs.
 - C) oxalate- hyperoxaluria may cause nephrocalcinosis and may result in calcium oxalate stones. Most common cause of secondary oxalosis is small bowel disease, especially after intestinal bypass operations for morbid obesity, but it may also be seen if the distal small bowel is involved in pts with celiac disease or Crohn's disease. They are not radioluxent.
 - D) xanthine- are very rare stones, in pts with hereditary xanthinuria but also may be present in pts with txed with allopurinol, which blocks the conversion of xanthine to uric acid. Xanthine stones are relatively radiolucent because their density is similar to uric acid stones.
- WA – I think if matrix stone was an option (like it was on the duke recalls), it would be the best option. Primer, "CT detects most calculi regardless of calcium content. The exceptions are matrix stones".

Stones Radiolucent on Plain Radiographs

- Uric Acid
- Xanthine
- Matrix
- Pure struvite
- Indinavir

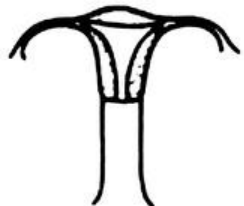
2008

- For patients who have a septated uterus, which of the below is true?
 - A) external contour is very important in differentiating septation from a bicornuate uterus
 - B) surgery is needed for correction
 - C) the cornua have an obtuse angle

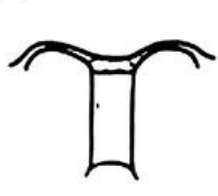
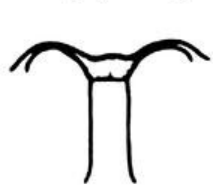
I Hypoplasia/agenesis



(a) Vaginal

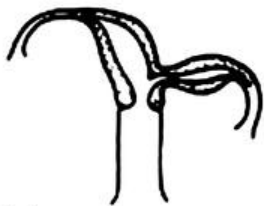


(b) Cervical

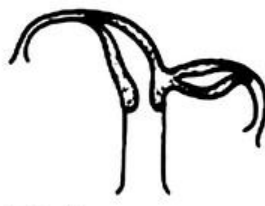


(c) Fundal (d) Tubal (e) Combined

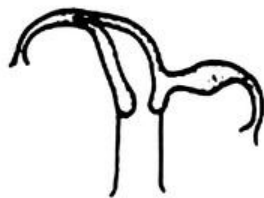
II Unicornuate



(a) Communicating



(b) Non Communicating



(c) No cavity



(d) No horn

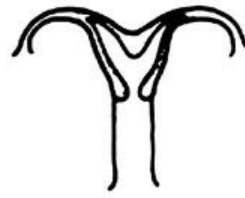
III Didelphus



IV Bicornuate

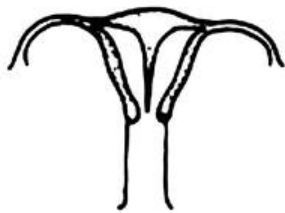


(a) Complete

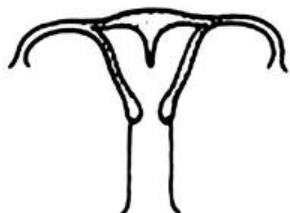


(b) Partial

V Septate

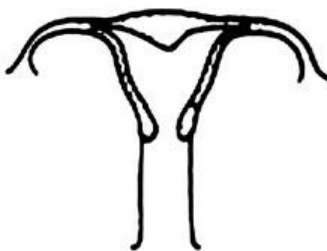


(a) Complete

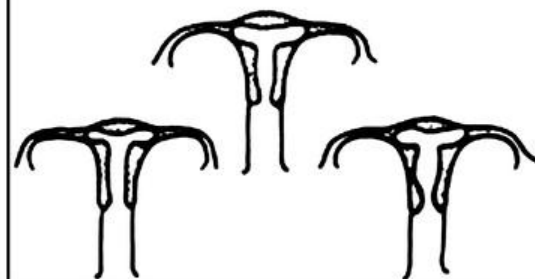


(b) Partial

VI Arcuate



VII DES drug related



2008

- What is not an indication for a sonohysterogram?
 - A) PID
 - B) congenital anomaly
 - C) infertility
 - D) synechiae
 - E) to better evaluate the endometrium

2008

- What is not an indication for HSG (Recall)?
 - A. Eval infertility
 - B. Eval acute infection
 - C. Eval abnormal endometrial thickening
 - D. Eval congenital anomalies

2008

- What is not an indication for HSG (Recall)?
 - A. Eval infertility
 - B. Eval acute infection
 - C. Eval abnormal endometrial thickening
 - D. Eval congenital anomalies

2008

- A) PID
- **Endometritis & Active Bleeding**
- Contraindications for HSG are active pelvic inflammatory disease, recent uterine or tubal surgery, active uterine bleeding, pregnancy and hypersensitivity to the contrast medium.
- <http://medinfo.psu.ac.th/smj2/173/smj1736.html>

2008

- A patient has a PSA of 8. What should you do?
 - A) do nothing
 - B) whole body bone scan
 - C) ultrasound and biopsy
 - D) CT A/P
 - E) MRI

2008

- ultrasound and biopsy.

2008

- Estrogen secreting tumor (recall variant):
 - A. Granulosa cell
 - B. Sertoli-Leydig cell tumor
 - C. Choriocarcinoma
 - D. Seminoma

2008

- Estrogen secreting tumor (recall variant):
 - A. Granulosa cell- secrete estrogen
 - B. Sertoli-Leydig cell tumor- secrete testosterone, androgen
 - C. Choriocarcinoma- Commonly associated with elevated serum alpha-fetoprotein, beta-hCG (chorionic gonadotropin)
 - D. Seminoma- Elevated serum beta-hCG, normal serum alpha fetoprotein

2008

- Most common cause of hydronephrosis after renal tx (new)?
 - A. Ureteral stricture at the bladder implantation site
 - B. Compression of ureter by a lymphocele
 - C. Chronic reflux
 - D. Ureteral kinking

2008

- Most common cause of hydronephrosis after renal tx (new)?
 - A. Ureteral stricture at the bladder implantation site
 - B. Compression of ureter by a lymphocele
 - C. Chronic reflux
 - D. Ureteral kinking
- *Dunnick says most common cause is ureteral ischemic strictures pg 239

2008

- Chronic hydronephrosis after renal transplant (probably the same question as the most common cause of hydro in a renal transplant).
 - A. fibrosis
 - B. external compression

Hydronephrosis

- Early: post operative edema of UVJ
- Late:
 - Compression by fluid collections
 - Denervation (non obstructive)
 - Ureteral ischemia, surgical technique
 - Rejection
 - Intraluminal clot or calculi

Ureteral Obstruction s/p Transplant

- Transient obstruction at the site of the ureteral implantation is common in the immediate postoperative period; it is usually caused by edema and subsides quickly.
- Ureteral obstruction that appears months to years after transplantation is more likely to be caused by ureteral ischemic strictures
- Rarely, acute obstruction is caused by blood clots, calculi, fungus balls, or sloughed papillae.
- Stones are reported to occur in approximately 1% of pts with renal allografts; most stone formers are thought to have underlying predisposing conditions.
- Dunnick pg 252
- In the immediate post-transplant period, mild caliectasis is common due to edema at the ureteric anastomosis site.
- Obstruction may also be caused by peritransplant fluid collections that may be seen also with US.
- Blood clots within the pelvicalyceal system may also yield hydronephrosis.
- Later strictures may occur primarily at the ureteral anastomosis site.
- Renal stones may also cause hydronephrosis during their passage to the bladder.
- A functional obstruction may be seen with an over distended bladder. US will demonstrate a resolution of the hydronephrosis with bladder emptying.
- Brenner and Rector's The Kidney, 8th ed
- Could not find the most common cause!

2008

- After straddle injury (recall variant):
 - A. Stricture of bulbar urethra
 - B. Stricture of membranous urethra
 - C. Stricture of prostatic urethra

2008

- After straddle injury (recall variant):

A. Stricture of bulbar urethra

B. Stricture of membranous urethra

C. Stricture of prostatic urethra

Urethral Strictures

- almost entirely limited to males.
- relatively uncommon
- In most cases, the stricture is iatrogenic or is secondary to external trauma or infection
- Sometimes the cause of the stricture is unknown.
- Iatrogenic strictures account for about 2/3 of the cases.
- Urethral strictures occurring after urethral instrumentation are located predominantly near the penoscrotal junction, an area that is particularly vulnerable to internal trauma.
- Pelvic fractures, penetrating injuries, direct blows to the perineum, and **straddle injuries are the most common forms of external trauma. The membranous urethra is the area most often injured, owing to its fixation by the urogenital diaphragm.**
- **Strictures from straddle injuries are usually located in the bulbar urethra**
- Urethral infections are uncommon causes of urethral strictures in children as opposed to young adults, in whom urethral strictures are often due to *Neisseria gonorrhoeae* infection. *The strictures caused by Neisseria predominate in the bulbar urethra and are usually multiple.*
- *Urethral strictures of unknown cause in symptomatic boys are not rare. They are located most often in the bulbar urethra and are usually very short and diaphragm-like. They may be the result of unrecognized external trauma or urethritis, Cowper's duct infection, or rupture of a Cowper's duct cyst or may be secondary to incomplete dissolution of the urogenital membrane at the junction of the cloaca and genital groove (Cobb's collar).*
- *The possibility of a congenital stricture is suggested in some cases, particularly when there is a family history of a similar lesion*

Urethral Strictures

- The clinical manifestations of urethral strictures include
 - poor urinary stream,
 - straining to void,
 - urinary retention,
 - painful urination,
 - hematuria,
 - urinary infections, and
 - recurrent epididymitis.
- The diagnosis is readily established by VCUG when the bladder can be catheterized.
- Compression of the distal penis during voiding (choke urethrogram) or RUG results in distention of the normal urethra and a better delineation of the true extent of the stricture.
- A voiding urethrogram using the contrast material accumulated in the bladder at the end of an IVU may be the only radiographic procedure available to study the urethra when catheterization of the bladder or a retrograde urethrogram is not possible.
- An alternative to fluoroscopic evaluation is US of the urethra, which provides information about the urethra as well as periurethral tissues.
- The urethra proximal to the stricture may be dilated.
- Bladder trabeculation, vesicoureteral reflux, and upper tract dilatation may coexist.
- In the interpretation of the urethrogram, it is important to keep in mind that normal areas of narrowing at the level of the urogenital diaphragm or narrowing caused by spasm of the bulbocavernosus or external sphincter muscles may simulate a stricture.

Urethral Anatomy

- The male urethra may be divided into 2 portions.
 - The posterior urethra includes the prostatic urethra, which extends from the bladder neck through the prostate gland. It then joins the membranous urethra, which lies between the prostatic apex and the perineal membrane.
 - The anterior urethra begins at that point and includes 3 segments.
 - The bulbar urethra courses through the proximal corpus spongiosum and ischial cavernosus-bulbospongiosus muscles to reach the penile urethra.
 - The penile urethra then extends through the pendulous portion of the penis to the final segment, the fossa navicularis.
 - The fossa navicularis is invested by the spongy tissue of the glans penis.
- The membranous urethra is prone to injury from pelvic fracture because the puboprostatic ligaments fix the apex of the prostate gland to the bony pelvis and thus cause shearing of the urethra when the pelvis is displaced.
- The bulbar urethra is susceptible to blunt force injuries because of its path along the perineum. Straddle-type injuries from falls or kicks to the perineal area can result in bulbar trauma.
- Conversely, the penile urethra is less likely to be injured from external violence because of its mobility, but iatrogenic injury from catheterization or manipulation can occur, which is also possible in the fossa navicularis.

2008

- What gives the appearance to the nephrographic phase of contrast enhancement (new)?
 - A. Filtration of contrast, tubular secretion of water
 - B. Filtration of contrast, tubular reabsorption of water
 - C. Filtration of contrast, tubular secretion of contrast
 - D. Etc.

Normal Nephrographic Physiology

- The main driving force for urine production is filtration pressure (blood pressure)
- Contrast is filtered. It is not excreted or reabsorbed by the tubules
- Contrast which gets into the nephron will eventually get to the collecting system

The currently used modern triiodobenzoic acid derivative contrast media are excreted by glomerular filtration without a significant component of tubular secretion. This is in contrast to the diiodo pyridone-based contrast media (diodrast and Neo-Iopax) in which a significant component of tubular secretion was present.

Dunnick pg 79

So c would be correct in reference to the old types of contrast - wa

2008

- Which of the following renal diseases are most likely unilateral (recall)?
 - A. ADPKD
 - B. ARPCKD
 - C. MCDK
 - D. Medullary cystic

2008

- Which of the following renal diseases are most likely unilateral (recall)?
 - A. ADPKD- Bilateral
 - B. ARPCKD- Bilateral
 - C. MCDK- Typically Unilateral, bilateral is not compatible with life
 - D. Medullary cystic- Bilateral

ADPKD

- inherited condition characterized by **multiple cysts of different sizes** throughout kidney
- Affects multiple organs: kidneys, liver, pancreas
- Cysts become larger and more numerous with increasing age
- **Usually bilaterally** involved, though changes may be more pronounced on one side only
- Kidneys may be normal in size or enlarged and lobulated
- Conglomerate cysts, often appearing as multicystic mass
- Cyst may rapidly enlarge, have atypical appearance in case of bleeding into cyst
- Neonate may present only with palpable enlarged **kidney(s)**
- **Symptomatic ADPKD is rarely encountered in neonatal period or childhood**
- **Systemic hypertension, hematuria, and slowly progressive renal insufficiency, Symptoms of ADPKD (renal failure, hypertension) rarely develop in childhood**
- **Patients usually present with renal failure or hypertension in their fourth or fifth decade**
- **Child may present with flank pain if there is bleeding into cyst**
- ADPKD is **most common of hereditary renal cystic diseases** (1 per 1000 live births)
- Spontaneous mutations are responsible for about 10% of cases
- About **15% of patients with ADPKD have aneurysm of circle of Willis**
- Onset of symptoms is usually at fourth decade; significantly contributes to many adults on dialysis
- **Increased incidence of uric acid stones** in affected adults
- **Associated with seminal vesicle cysts, congenital hepatic fibrosis (predates appearance of renal cysts)**

ARPKD

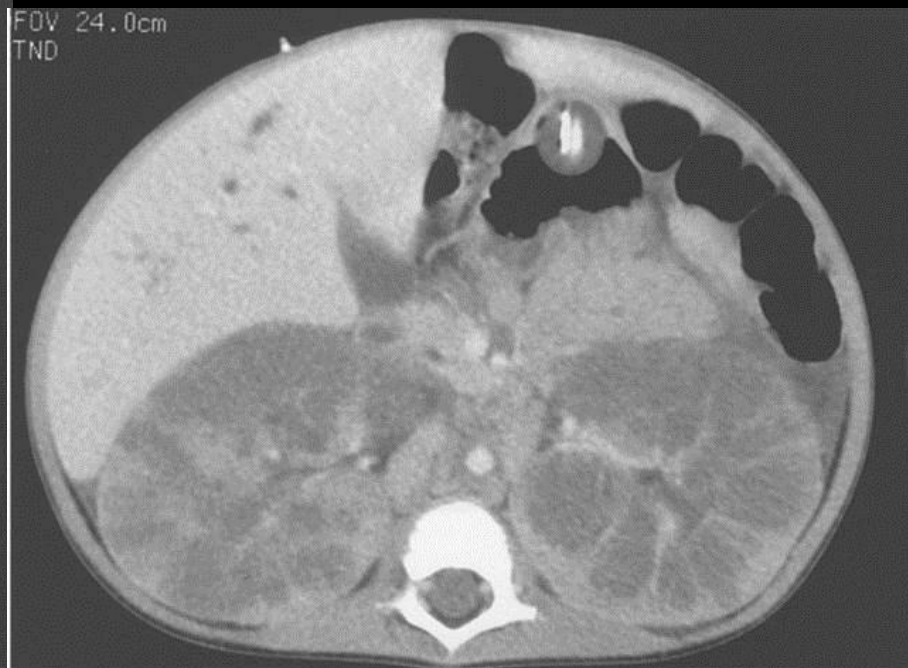
- Autosomal recessive inherited renal disease characterized by multiple kidney cysts, duct ectasia, and fibrosis of kidney and liver
- There are three forms, characterized by duct ectasia, fibrosis in kidney, liver
- Degree of fibrosis and ectasia is not parallel in same organ
- Degrees of involvement of liver and kidney tend to be inversely proportional to each other
- **Bilaterally** enlarged echogenic kidney
- Duct ectasia and fibrosis of kidney and liver, with ectasia possibly presenting as cyst "Spoke-wheel" appearance
- Many affected infants are seen at birth or soon thereafter with enlarged abdomen, flank masses, poor urine output
- Severe cases may present with respiratory distress caused by hypoplasia of lungs and other features of Potter sequence
- Juvenile form presents with minimal renal disease, portal hypertension from significant hepatic fibrosis, longer survival
- Late, frequent complications include systemic hypertension and symptoms of hepatic fibrosis: portal hypertension with subsequent hypersplenism, gastroesophageal varices
- Many affected patients expire in newborn period or shortly thereafter from respiratory failure, renal failure, or hypertension
- Less severely affected neonates may live longer, sometimes several months or years, with progressive renal insufficiency, hypertension



B

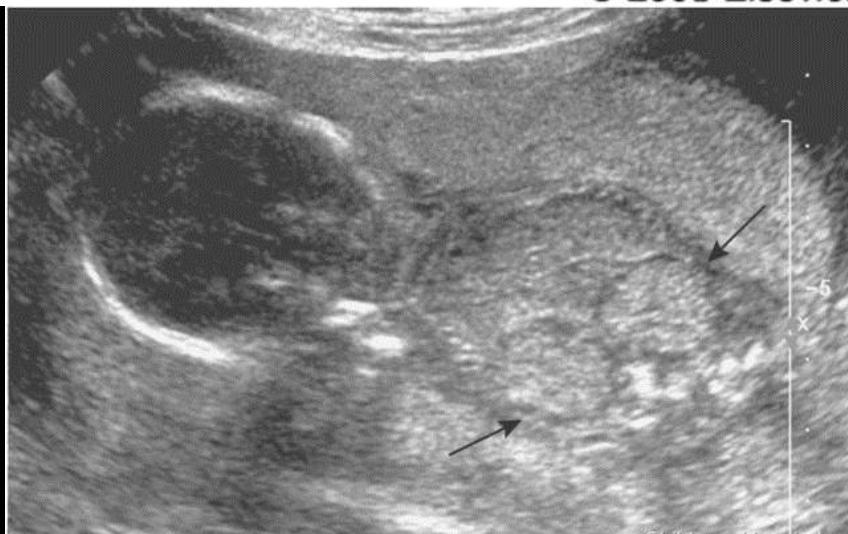
T1W- spoke wheel

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B

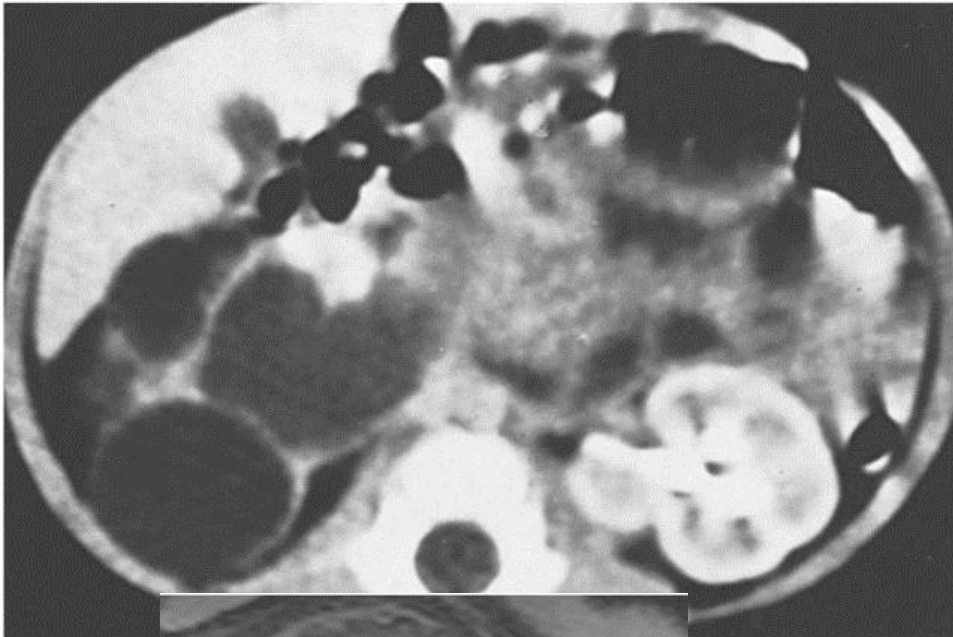
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ARPKD- Noncontrast CT shows that the **pathologic process is medullary**. The dilated tubules have produced a linear pattern that can be clearly seen in a few regions. Cortical thinning, present along the anterior aspect of each kidney, is not a typical finding, because the **cortex is usually spared**.

MultiCystic Dysplastic Kidney

- Congenital nonheritable cystic renal dysplasia
- Cysts of various size that do not connect to central renal pelvis
- Two types of **multicystic dysplastic kidney (MCDK)**: **pelvoinfundibular type (noncommunicating cysts)** and **hydronephrotic type (communicating cysts)**
- Pelvoinfundibular type is the classical form of MCDK, characterized by cluster of cysts within disorganized and **dysplastic renal tissue**
- **Typically unilateral** with no function of affected kidney, may also be bilateral (as occurs in Meckel-Gruber syndrome)
- **Kidney may be small, normal or large in size**
- **Numerous cysts of varying size, may be several centimeters in diameter, are randomly distributed within kidney**
- May also consist of only few large cysts
- No normal parenchyma or central renal pelvis Reflux or partial ureteropelvic junction (UPJ) obstruction in contralateral **kidney**
- Bilateral MDCK frequently leads to fetal demise or stillbirth as result of severe oligohydramnios and pulmonary hypoplasia (Potter's sequence)
- As long as contralateral **kidney has adequate renal function, outcome is good**
- **Typically, cysts involute, sometimes disappearing by third trimester**

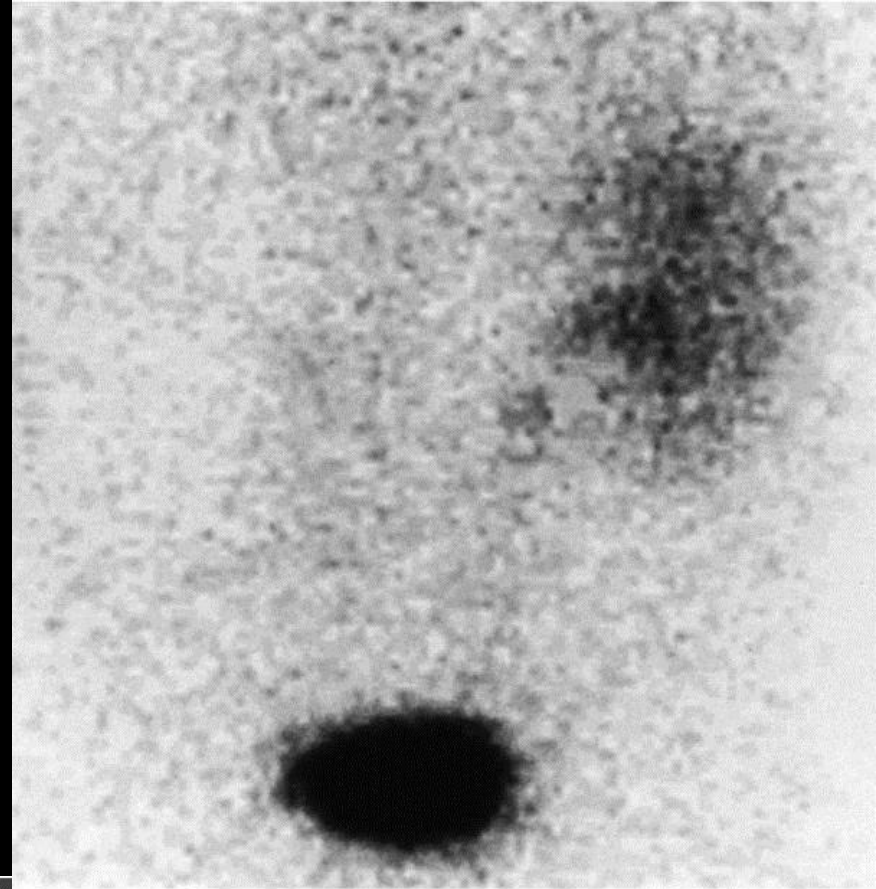


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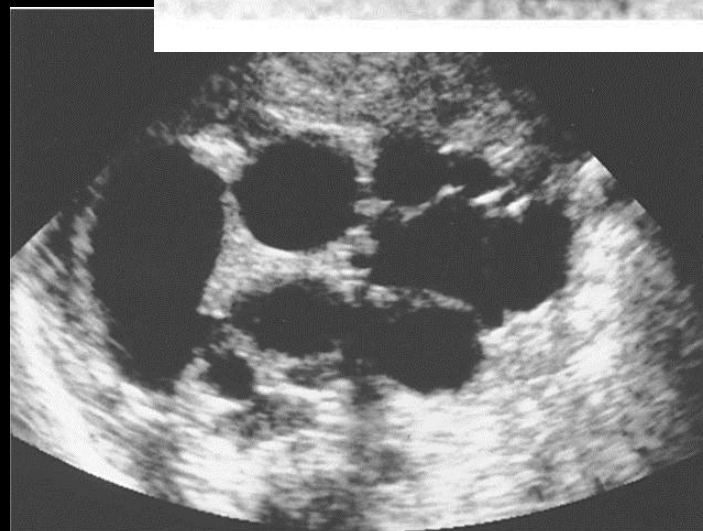
B



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A

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MCDK

Medullary Cystic Dysplasia

- Salt wasting nephropathy causing chronic renal failure in adolescents/young adults
- Variable # of medullary cysts (10mm to 2cm) + progressive periglomerular and interstitial fibrosis + tubular atrophy with dilatation of some proximal tubules
- Types
 - Medullary Cystic Disease= Adult onset, AD, in young adults, rapidly progressive course with uremia + death in 2 yrs
 - Juvenile Nephrophthisis= Juvenile Onset= Uremic medullary cystic disease, AR, in children 3-5 yrs of age, avg duration of 10 yrs before uremia and death occurs
- Salt wasting, polyuria, hyposthenuria, polydipsia
- Failure to thrive, growth retardation (early teens)
- Uremia, severe anemia, normal sediment, HTN (only in late phase)
- Bilateral normal/ small kidneys with smooth contour
- Thin Cortex
- IVP= poor opacification of renal collecting system. Medullary nephrogram= medullary striations persistent for up to 2 hours; occasionally replaced by sharply defined multiple thin walled lucencies
- Retrograde pyelogram= communication btw collecting system + cysts
- US/CT: increased parenchymal echogenicity + loss of corticomedullary jx, multiple small corticomedullary/medullary cysts

2008

- History of prostate CA, now with mass encasing ureters (recall)?
 - A. Lymphoma
 - B. Retroperitoneal fibrosis (Ormond's)
 - C. Recurrent prostate Ca

2006

- **A 56 year old male with a history of prostate cancer now has a retroperitoneal soft tissue mass which encases, but does not displace the adjacent mesenteric vessels. The soft tissue is dark on both T1 and T2 weighting. What is the most likely diagnosis?**
- A. Lymphoma
- B. Prostate metastases
- C. Mesenteric fibrosis

Mesenteric (Retroperitoneal) fibrosis

- The Lancet
- Volume 367, Issue 9506, 21 January 2006-27 January 2006, Pages 241-251
- **Retroperitoneal fibrosis** encompasses a range of diseases characterised by the presence of a fibro-inflammatory tissue, which usually surrounds the abdominal aorta and the iliac arteries and extends into the retroperitoneum to envelop neighbouring structures—eg, ureters. Retroperitoneal fibrosis is generally idiopathic, but can also be secondary to the use of certain drugs, malignant diseases, infections, and surgery

Retroperitoneal Fibrosis

- In most patients (approximately 68%), no etiologic factor is found.
- Evidence suggests that RPF is an autoimmune response to an insoluble lipid called ceroid that has leaked through a thinned arterial wall from atheromatous plaques.
- Other implicated causes include drugs, abdominal aortic aneurysm, ureteric renal injury, infection, retroperitoneal malignancy, postirradiation therapy, chemotherapy and hemilaminectomy, hypothyroidism and carcinoid tumor.
- No genetic predominance is seen in malignant retroperitoneal fibrosis
- Immunosuppressive drugs, such as azathioprine, cyclophosphamide, and tamoxifen, have been used to treat RPF
- The coexistence of RPF with primary biliary cirrhosis, fibrosing mediastinitis, panhypopituitarism, glomerulonephritis, rheumatoid arthritis, systemic lupus erythematosus (SLE), polyarteritis nodosa, ankylosing spondylitis, and Riedel²³ or Hashimoto thyroiditis support the hypothesis of an immune-mediated mechanism.
- The association of RPF with the prolonged use of certain drugs and with the improvement of clinical symptoms (in most instances after cessation of the drug therapy) indicates that the fibrotic process is the end stage of vasculitis resulting from a hypersensitivity reaction to various antigens such as drugs and diseases. Drugs implicated in causing RPF include methysergide, beta-adrenergic blockers, lysergic acid diethylamide, methyldopa, amphetamines, phenacetin, pergolide (withdrawn from US market March 29, 2007), and cocaine.

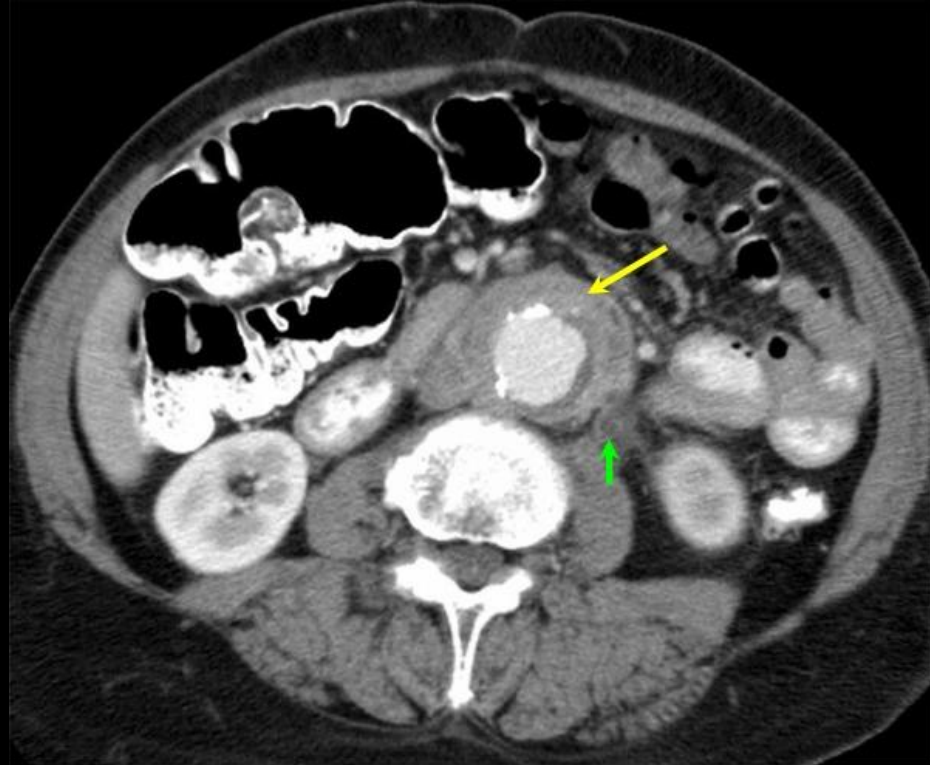
Retroperitoneal Fibrosis

- CT

- Cmay appear as a rind of soft tissue around the aorta and inferior vena cava extending between the renal hilum and sacral promontory.
- Laterally, RPF spreads to involve the ureters, causing varying degrees of obstruction.
- The fat plane between the mass and the psoas muscle may be obliterated
- .The mass tends not to displace the aorta anteriorly
- .The attenuation value of the mass is similar to that of muscle and shows variable degrees of enhancement depending on the stage of the disease.
- Certain CT features can help in differentiating benign masses from malignant masses.
- The mass in RPF may be bulky but not as massive as neoplastic lesions; however, some exceptions exist. The presence of enlarged mesenteric nodes and displacement of the aorta from the spine by the periaortic mass favors malignancy, although some displacement can occur in RPF. Unlike RPF, most retroperitoneal neoplasms displace the ureters laterally.
- RPF does not produce local bone destruction

- Magnetic Resonance ImagingFindings

- RPF appears as a mass with low signal intensity on T1-weighted images and variable signal on T2-weighted images, depending on the activity of the disease.
- On T2-weighted images, RPF may appear hyperintense when active inflammation is present and hypointense in end-stage fibrosis.
- Inhomogeneous signal intensity on T2-weighted MRIs suggests malignancy.



2008

- Cystic mass in the anterior superior bladder in male (new):
 - A. Urachal cyst
 - B. Mullerian cyst
 - C. TCC
 - D. Ureterocele

2008

- Cystic mass in the anterior superior bladder in male (new):
 - A. Urachal cyst- anterior and superior
 - B. Mullerian cyst- rare, most commonly occur in the midline just above the prostate
 - C. TCC

2008

- What is a characteristic of TB UTI (new)?
 - A. Calcification early
 - B. Tends to be symmetric
 - C. Usually active pulmonary dz
 - D. Cysts in medulla that mimic papillary necrosis

2008

- What is a characteristic of TB UTI (new)?
 - A. Calcification early
 - B. Tends to be symmetric- False
 - C. Usually active pulmonary dz- False
 - D. Cysts in medulla that mimic papillary necrosis- True

Renal TB

- Approximately 4%–8% of patients with pulmonary TB **will develop clinically significant GU infx**
- About 25% of patients who present with tuberculous genitourinary disease have a known history of prior pulmonary **tuberculosis; an additional 25%–50% of patients will have radiographic evidence of prior subclinical pulmonary infection**
- **Tuberculosis of the kidney results from hematogenous seeding of *M tuberculosis* in the glomerular and peritubular capillary bed from a pulmonary site of primary infection**
- Small granulomas form in the **renal cortex bilaterally, adjacent to the glomeruli.**
- Multiple bilateral cortical granulomas can remain asymptomatic and dormant for decade
- In some patients, breakdown of host defense mechanisms leads to reactivation of the cortical granulomas with enlargement and coalescence
- Capillary rupture results in delivery of organisms to the proximal tubule and loop of Henle with eventual development of enlarging, caseating granulomas and papillary necrosis
- Granuloma formation, caseous necrosis, and cavitation are stages of progressive infection, which can eventually destroy the entire kidney. Communication of the granulomas with the collecting system can lead to regional spread of the bacilli into the **renal pelvis, ureters, urinary bladder, and accessory genital organs.**
- **The host's healing response induces fibrosis, calcium deposition, and stricture formation, which may contribute significantly to obstruction and progressive renal dysfunction**

Renal TB

- Despite hematogenous seeding of both kidneys, clinically significant disease is usually limited to one side
- There is often a long latency period (5–40 years) between initial infection and expression of genitourinary disease
- To evaluate for genitourinary **tuberculosis**,
 - at least three first-morning-void urine samples should be collected for acid-fast staining and mycobacterial cultures.
 - First-morning-void specimens are preferred over 24-hour urine collections because mycobacterial viability decreases with prolonged exposure to acid urine
- **Renal calcifications**
 - are a common manifestation of tuberculosis at conventional radiography, occurring in 24%–44% of patients.
 - Extensive parenchymal calcification in a nonfunctioning, autonephrectomized kidney (putty kidney) is characteristic of end-stage **tuberculosis**.
 - Calcifications may also be amorphous, granular, or curvilinear, typically within the **renal parenchyma**.
 - Focal globular calcification involving an entire **renal lobe** is frequently associated with a **granulomatous mass**.
 - Triangular ringlike calcifications within the collecting system are characteristic of papillary necrosis.
- Other extrapulmonary manifestations of mycobacterial disease, such as mesenteric lymph node and **adrenal calcifications**, as well as **spinal abnormalities**, may be visible
- Irregularity of the papillary tips secondary to necrotizing papillitis ("moth-eaten" calices) is an early finding

Renal TB

- Small cavities in the papillae can progress to become medullary cavities that communicate with the collecting system
- Papillary cavitation results in the spread of infection to the urothelium and submucosa of the draining calix.
- A fibrotic reaction develops, which causes stenosis and strictures of the caliceal infundibula
- Infundibular strictures can lead to localized caliectasis or incomplete opacification of the calix (phantom calix)
- Some patients may present with generalized hydronephrosis
- Scarring can cause sharp angulation of the renal pelvis (Kerr kink)
- Ureteral involvement occurs due to the passage of infected urine.
- Such involvement first manifests as dilatation and mucosal irregularity (sawtooth ureter), which may progress, with advanced disease, to the formation of strictures and ureteral shortening (pipe-stem ureter)
- Fusion of multiple strictures may create a long, irregular narrowing.
- Several nonconfluent strictures can produce a "beaded" or "corkscrew" ureter
- Reduced bladder capacity is the most common finding in tuberculous cystitis. The bladder may be diminutive and irregular with advanced disease (thimble bladder)

Renal TB

- renal calcifications occur in over 50% of cases of genitourinary tuberculosis
- Coalesced cortical granulomas containing either caseous or calcified material are readily identified at CT.
- Calices that are dilated and filled with fluid have an attenuation between 0 and 10 HU; debris and caseation, between 10 and 30 HU; putty-like calcification, between 50 and 120 HU; and calculi, greater than 120 HU
- Cortical thinning is a common CT finding and may be either focal or global
- Parenchymal scarring is readily apparent at CT
- Fibrotic strictures of the infundibula, renal pelvis, and ureters may be seen at contrast-enhanced CT and are highly suggestive of tuberculosis.
- CT is not as sensitive as excretory urography in the detection of early urothelial mucosal changes but is useful in determining the extent of renal and extrarenal spread of infection

Renal TB

- Without surgery, the 5-year survival rate of patients with renal tuberculosis was 15%–42%; surgical intervention increased the 10-year survival rate to approximately 50%
- Early continuous multidrug chemotherapeutic regimens were successful in reducing mortality to a rate of 2.2%
- The current standard of care for drug-sensitive urinary tract tuberculosis in a compliant patient consists of a 6-month regimen of isoniazid and rifampin, with pyrazinamide added for the first 2 months
- A fourth drug—ethambutol hydrochloride, streptomycin, or one of the fluoroquinolones—is typically included unless the possibility of drug resistance is exceedingly small
- Despite treatment, strictures of the infundibula and ureters can progress secondary to the body's healing response.
- Surgical intervention is indicated for management of complications, including ureteral strictures
- The issue of nephrectomy for management of a nonfunctioning end-stage tuberculous kidney is controversial.
- Several authors maintain that a 2-year course of medical treatment can sterilize the end-stage kidney whereas others believe that the sequestered, caseous material should be removed to shorten the duration of medical therapy and to prevent late tuberculous reactivation
- The differential diagnosis for the imaging appearance of renal tuberculosis includes chronic pyelonephritis, papillary necrosis, medullary sponge kidney, caliceal diverticulum, renal cell carcinoma, transitional cell carcinoma, and xanthogranulomatous pyelonephritis
- The most valuable radiologic feature of genitourinary tuberculosis is the multiplicity of abnormal findings
- Whenever a pattern of chronic renal inflammatory disease is recognized, particularly in the setting of periureteric or peripelvic fibrosis, tuberculosis must be considered clinically

2008

- Renal lesion measures negative 76 HU on CT.
What to do next (new)?
 - A. Biopsy
 - B. MRI
 - C. Do nothing

2008

- Renal lesion measures negative 76 HU on CT.
What to do next (new)?

A. Biopsy

B. MRI

C. Do nothing

2008

- Pt with known bladder cancer has adrenal lesion measuring 30 HU on CECT. What to do next (recall variant)?
 - A. Refer to surgery, tell her she has mets
 - B. Repeat CT with noncon, immediate postcon, and delayed
 - C. Followup 3 months
 - D. Biopsy

2008

- Pt with known bladder cancer has adrenal lesion measuring 30 HU on CECT. What to do next (recall variant)?
 - A. Refer to surgery, tell her she has mets
 - B. Repeat CT with noncon, immediate postcon, and delayed
 - C. Followup 3 months
 - D. Biopsy

If the adrenal mass is more than 10HU at noncontrast CT, CT with intravenous contrast material should be performed to evaluate enhancement washout characteristics. Adenomas lose enhancement more rapidly than nonadenomas, and delayed CT attenuation value was used to differentiate adenomas from nonadenomas. Using an attenuation measurement of less than 30 to 40HU at 10 to 30 minutes after contrast injection, the adrenal mass is almost always an adenoma.⁶³ A relative percentage enhancement washout of greater than 50% calculated by $[1 - \text{delayed enhanced HU value}/\text{initial enhanced HU value}] \times 100$ has a sensitivity of 98% and specificity of 100% for benign disease.⁶⁴ Other investigators used percentage enhancement washout calculated by $[\text{initial enhanced HU value} - \text{delayed enhanced HU value}]/[\text{initial enhanced HU value} - \text{unenhanced HU value}]$ with a

threshold of 60% at 50 to 80 seconds after administration of contrast material for the initial scan and 15 minutes for the delayed scan, and achieved 86% to 98% sensitivity and 92% to 96% specificity.^{65,66}

When CT with intravenous contrast is equivocal, chemical shift MR imaging should be performed as chemical shift MR imaging is the most sensitive technique for differentiating adenomas from metastases of the adrenal gland.³⁸ With the chemical shift MR technique, the sensitivity and specificity for differentiating adenomas from metastasis ranges from 81% to 100% and 94% to 100%, respectively.⁶⁷⁻⁷⁰ Reported cases of nonadenomas that met these CT or MRI criteria for adenoma, included pheochromocytoma,⁷¹ metastasis from renal cell carcinoma, and adrenocortical carcinoma.^{66,72}

Oncology

By Alfred E.
Chang, Patricia A.
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2008

- What increases risk of ureteral malignancy (recall)?
 - A. Ureteritis cystica
 - B. Bladder carcinoma
 - C. Chronic TB
 - D. Malacoplakia

2008

- What increases risk of ureteral malignancy (recall)?
 - A. Ureteritis cystica- NOT premalignant
 - B. **Bladder carcinoma**- Ureteral Ca- an associated transitional cell ca of the bladder is found in approximately 25% of pts and as many as 70% have an antecedent or subsequent urothelial lesions elsewhere. For this reason, complete nephroureterectomy is the standard therapy for lesions that are resectable at the time of diagnosis.
 - C. Chronic TB
 - D. Malacoplakia

Ureteritis Cystica

- Multiple, small, subepithelial fluid-filled cysts in the ureteral wall
- Thought to be caused by degeneration of the central cells of the basal layer of the urothelium, which results in proliferation of the surface epithelial cells; these become isolated from the epithelial surface and form fluid-filled cysts that project into the lumen of the ureter
- This degeneration occurs with chronic UTI
- May appear in the ureter, renal pelvis (pyelitis cystica), or bladder (cystitis cystica)
- Usually asymptomatic
- May have hematuria and symptoms of UTI
- May or may not resolve
- Does not cause obstruction
- **Is NOT Premalignant**
- Unilateral or bilateral
- More frequent in women
- Usually in pts btw 50-60
- Radiographic appearance
 - Multiple, small (2-3mm) radiolucent filling defects that cause scalloping of the ureteral margins when seen in profile during excretory urography or retrograde pyelography
 - Filling defects have a predilection for the proximal 1/3
 - May regrow or disappear or persists
- DDx
 - Small air bubbles introduced at retrograde pyelography
 - Hemorrhage into the ureteral wall
 - Papillary neoplasms- rarely as numerous
 - Prolonged ureteral stenting- uroepithelium grows into the side holes producing filling defects



Pyeloureteritis cystica

Malacoplakia

- Uncommon form of granulomatous renal inflammatory disease
- Histo- presence of distinct histiocytes (von Hansemann's cells) containing basophilic staining inclusions called Michaelis-Gutmann bodies- thought to represent phagocytized fragments of bacteria.
- May occur throughout the urinary tract
- May occur in the GI tract, ureters, vagina, adrenal gland, breast, skeleton and brain
- Renal parenchyma malacoplakia (RPM) accounts for 16% of the reported cases in the urinary tract
- Women > men
- Peak incidence in pts >50 yrs
- Si/Sx= fever, flank pain and palpable flank mass
- Most have active UTIs
- Hx of altered host resistance including autoimmune disease, alcoholism, carcinoma, or RA
- Two forms of RPM
 - Multifocal involvement occurs in 75% of pts, reported to be bilateral in one half of these pts. The kidney is enlarged and contains multiple yellow brown masses that range in size from a few mms to a few cms
 - Unifocal RPM= (25% of cases) presents as a solitary mass ranging in size from 2-8 cm that is sharply demarcated from the remainder of the kidney
- Rads findings depend on type of involvement
- Multifocal RPM
 - Diffuse enlargement of the kidney is found frequently
 - Excretion of contrast material is diminished in more than one half of the cases
- The urogram may demonstrate a mass compressing the calyces
- US- may demonstrate multiple ill defined masses of varying echogenicity.
- CT- multiple soft tissue masses within the kidney that enhance less than normal renal parenchyma, may see extension of inflammatory process into the retroperitoneum
- Angiography- stretching of the intrarenal branch vessels with an inhomogeneous angiographic nephrogram
- Neovascularity may be present
- May be complicated by Renal vein Thrombosis
- Unifocal appears as a mass and can't be differentiated from tumor
- Diagnosis is rarely established preoperatively
- Major organ involvement reported to have 50% mortality
- Unilateral disease tx= nephrectomy
- Bilateral disease= renal failure is common

2008

- When is ureteral reflux expected (new)?
 - A. Ureteroneocystostomy
 - B. Ileal conduit
 - C. Continent urinary reservoir

2008

- When is ureteral reflux expected (new)?
 - A. Ureteroneocystostomy- renal transplant surgery where ureter of transplant kidney is now connected to the bladder
 - B. **Ileal conduit**-Ileal conduit. To create an ileal conduit, the surgeon takes a short segment of the small intestine and reconnects the remaining intestine so that it functions normally. One end of the removed short segment of intestine is placed at the skin surface to create the stoma. The ureters, which normally carry urine from the kidneys to the bladder, are then attached to the other end of the segment of intestine. The urine travels through the newly formed ileal conduit and the stoma into an external collecting pouch. The pouch has an outlet for releasing urine into a toilet without removing it from your stoma.
 - C. Continent urinary reservoir= Reflux resolves and reservoir matures. Another method of storing and eliminating urine is the continent diversion. In this method, the surgeon creates a pouch, or reservoir, inside your body from a section of your stomach or small or large intestine. The ureters carry urine to the pouch, where it is stored. Depending on the type of continent diversion, you may or may not have a stoma.
Continent cutaneous reservoir. This form of continent diversion does include a stoma. This method requires you to empty the reservoir, the internal pouch, regularly through the stoma using a catheter or thin plastic tube. If your urethra is preserved during the operation, you may be able to have a urinary diversion that does not require a stoma or catheter. Bladder substitute. This method lets you urinate through your own urethra as you did with your original bladder, or you may have to empty using a catheter through your urethra. The surgeon creates an internal pouch that stores urine as your bladder did. It is connected to your urethra so you may be able to empty your bladder in the normal way, although you will need to use different muscles to expel the urine.

2008

TB in Kidney

- A. Assoc with active lung Dz
- B. Mimics papillary necrosis
- C. Strictures

2008

TB in Kidney

- A. Assoc with active lung Dz
- B. Mimics papillary necrosis
- C. Strictures

WA's thoughts

TB in Kidney

A. Assoc with active lung Dz

- A. True- Dunnick p 293, "renal TB....is a result of hematogenous dissemination of the organisms to the kidney from other sites, usually the lungs"

B. Mimics papillary necrosis

- A. True

C. Strictures

- A. True – Dunnick, "the typical lesions of tuberculosis are collecting system and ureteral strictures, often occurring at multiple levels"

I think they are all true

Better recall

- Which of the following is true regarding tuberculosis of the kidney:

Usually affects both kidneys

Blunting of the calyces similar to papillary necrosis

Calcification and ureteral obstruction are early complications

Associated with active pulmonary infection

2008

- Nephrostogram what to do?
 - A. Enter Post calyx
 - B. Enter Ant calyx
 - C. Renal Sinus

2008

- Nephrostogram what to do?
 - A. Enter Post calyx
 - B. Enter Ant calyx
 - C. Renal Sinus

Percutaneous Nephrostomy

- Guidance:
 - Using Bony Landmarks: collecting system is punctured with a 21g or 22G Chiba Needle. When urine is aspirated contrast material is injected, delineating the collecting system. The PCN is then performed using fluoroscopy.
 - In most pts the kidney occupies a fairly constant position. In the prone position, a vertical puncture 4 fingers from the midline just below the 11th rib will enter the kidney, allowing aspiration of urine and injection of contrast for opacification.
 - US can be used.
- Technique
 - Collecting system is ideally accessed through a lower or mid calyx of the posterior group
 - Intercostal routes= high complication rates and should be avoided
 - Site of entry into the collecting system should be through the calyx
 - Ideal posterolateral approach to a posterior calyx. This approach is advantageous because it minimizes the risk of arterial injury and provides a straight bector for advancement of guidewires, dilators, and catheters into the renal pelvis. The tract is far enough lateral not to traverse paraspinal muscles but not so lateral as to risk colon perforation.
 - Place guidewire down the ureter
 - Dilate the track
 - Place nephrostomy tube

2008

- Pt with RA Stenosis s/p angioplasty then shows up with Htn, CHF and pulm edema. What is the problem?
- A. AVM
- B. Renal art embolism

2008

- Pt with RA Stenosis s/p angioplasty then shows up with Htn, CHF and pulm edema. What is the problem?
- A. AVM- Not a listed complication of the procedure
- B. Renal art embolism
- ?? Causes of pulm edema are seen with bilateral renal artery stenosis.

Renal Angioplasty

- Complications
 - Reported in 5-10% of cases
 - Renal artery dissection
 - Renal artery thrombosis
 - Renal artery rupture
 - Distal Renal or Aortic Embolization of Clot
 - Access site complications

What are the symptoms of renal artery stenosis?

Here are some common signs that you may have developed renal artery stenosis:

- sudden onset of hypertension
- hypertension not responsive to three or more blood pressure medications
- increased urea (waste product excreted by the kidneys) in the blood
- unexplained kidney failure
- sudden kidney failure upon first taking an angiotensin-converting enzyme (ACE) inhibitor medication
- reoccurrence of flash pulmonary edema (FPE), a build-up of fluid in the lungs

2007

- The reason for inhibition of ureteral reflux in normal patients is which one of the following:
 - ureteral peristalsis
 - detrusor contraction
 - low hydrostatic pressure in noncontracting urinary bladder
 - anatomy of the vesicoureteral junction

- Anatomy of UVJ
- Ureteral tunnel length to ureteral diameter ratio should be at least 3:1 to maintain UVJ competence
- Larger ureteral orifice, more lateralized ostium position and shorter submucosal tunnel add to VUR severity
- VUR associated with anatomic anomalies (large ureteral orifice, short submucosal tunnel) at cystoscopy is not likely to resolve

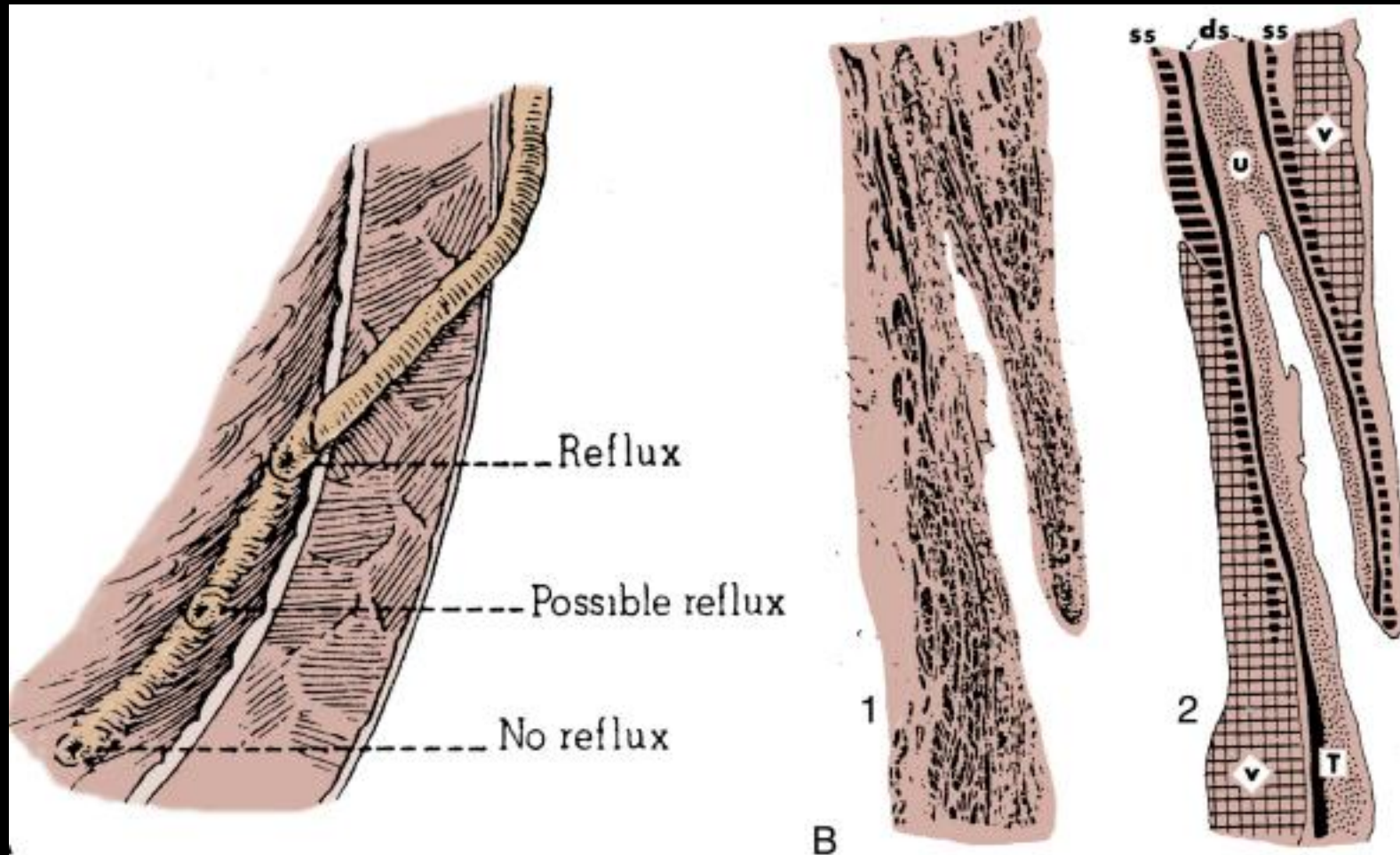


Figure 117-1 A, A refluxing ureterovesical junction has the same anatomic features as a nonrefluxing orifice, except for inadequate length of the intravesical submucosal ureter. Some orifices with marginal submucosal tunnels may reflux intermittently. B, Ureterovesical junction in longitudinal section. 1, Photomicrograph; 2, diagrammatic representation. The ureteral muscularis (u) is surrounded by superficial (ss) and deep (ds) periureteral sheaths that extend in the roof of the submucosal segment and continue beyond the orifice into the trigonal muscle (t). The relationship of the superficial sheath to the vesical muscularis (v) is clearly seen. Transverse fascicles in the superior lip of the ureteral orifice belong to the superficial and deep sheaths. No true space separates ureter from bladder. (A, From Glenn J [ed]: *Urologic Surgery*, 2nd ed. New York, Harper & Row, 1975; B, from Elbadawi A: *Anatomy and function of the urethral sheath*. *J Urol* 1972;107:224.)

2007

- **In single collecting system, what is likely cause of VUR:**
 - A. Medial insertion of ureter
 - B. Lateral insertion of ureter
 - C. Short intramuscular segment of ureter

C. Short intramuscular segment of ureter

- Short submucosal ureteral tunnel (normally has a length/width ratio of 4:1)
 - *Dahnert*
 - *Emedicine; VUR*

2007

- **What is the most worrisome sign for malignancy in a renal cyst?**
 - A. Thickened septum
 - B. Calcification
 - C. A cyst that enhances to 67 HU from 42 HU

A cyst that enhances to 67 HU from 42 HU

- Bosniak Category IV (malignant) - Contains enhancing (>10 HU) large nodules or clearly solid components (>90% likelihood of malignancy)
 - *Emedicine; Renal Cystic Disease*
 - Category I (simple cyst) - Thin wall without septa, calcifications, or solid components; measures water density (<20 HU) and does not enhance (<2% chance of malignancy)
 - Category II (minimally complex cyst) - Thin wall (<1 mm) and no enhancement; may contain 1 or 2 hairline-thin septa, fine calcification, or short segment of slightly thickened **calcification**; includes high-attenuation lesions that are smaller than 3 cm (Malignancy rates in series range from 0-14%. Series with higher malignancy rates include IIF lesions.)
 - Category IIF (indeterminate) - Minimal enhancement and/or **thickening of a hairline-thin smooth septum or wall; mildly thickened or nodular calcification**; no enhancing soft-tissue components; includes nonenhancing high-attenuation lesions that are 3 cm or larger (approximately 20% likelihood of malignancy)
 - Category III (suspicious indeterminate) - Multilocular lesion with multiple enhancing septae, uniform wall thickening, nodularity, or thick or irregular calcification (30-60% likelihood of malignancy)

2007

- **Metastases from a right testicular CA will characteristically be located where first?**
 - A. Right infrarenal/paracaval LN
 - B. Right inguinal LN

Right infrarenal/paracaval LN

- Right-sided tumors spread to the paracaval and interaortocaval nodes inferior to the renal vessels.
- Left-sided NSGCTs typically spread first to the left para-aortic and then preaortic lymph nodes inferior to the renal vessels.
 - *Emedicine; Testicular Tumors: Nonseminomatous*

- What is the first lymph node chain to receive mets from testicular seminoma?(left, right?)
 - Infrarenal and paraaortic nodes
 - Common iliac nodes
 - Inguinal nodes

- A
- Lymphatic drainage is to lateral aortic and preaortic nodes. DI, abdomen.
- Answer a.

2007

- Male with longstanding HTN demonstrates a unilateral adrenal mass with loss of signal from in-phase to out-of-phase imaging
 - A. Functioning adrenal adenoma
 - B. Nonfunctioning adrenal adenoma with essential HTN
 - C. Pheochromocytoma

Nonfunctioning adrenal adenoma with essential HTN

- Pheochromocytoma
 - usually shows low signal intensity on T1-weighted images and high signal intensity on T2-weighted images.
 - In addition, most pheochromocytomas enhance intensely on **MRI** with contrast administration.
 - However, T2-weighted intensity is highly variable, leading to as many as 35% of pheochromocytomas being misclassified. Therefore, high signal intensity on T2-weighted images should not be used exclusively to imply or to exclude the diagnosis.
 - In rare instances, pheochromocytomas may contain sufficient intracellular lipid to show signal dropout on opposed phase imaging, mimicking benign **adrenal adenomas**
 - *AJR* Teaching File: Incidental **Adrenal** Mass and Hypertension
- Approximately 80% of AAs are nonfunctioning and benign

2007

- **Unilateral hydronephrosis with area of decreased T1 and T2 signal in the retroperitoneum adjacent to ureter**
 - A. Retroperitoneal fibrosis
 - B. Lymphoma
 - C. Metastatic disease

Retroperitoneal fibrosis

- RPF
 - appears as a mass
 - with low signal intensity on T1-weighted images and
 - variable signal on T2-weighted images, depending on the activity of the disease.
 - RPF may appear hyperintense when active inflammation is present and
 - hypointense in end-stage fibrosis.
 - Inhomogeneous signal intensity on T2-weighted MRIs suggests malignancy
- Most malignancies demonstrate high signal intensity on T2-weighted images; therefore, differentiating the early stage of RPF from malignancy may not be possible.
 - *Emedicine; Retroperitoneal Fibrosis*

2007

- **Elderly man with bilateral hydronephrosis and mild increase in creatinine**
 - A. Reflux
 - B. Retroperitoneal fibrosis
 - C. PUV
 - D. Bladder mass (or was it mets?)
 - E. Enlarged prostate

2007

- **Elderly man with bilateral hydronephrosis and mild increase in creatinine**
 - A. Reflux
 - B. Retroperitoneal fibrosis
 - C. PUV
 - D. Bladder mass (or was it mets?)
 - E. Enlarged prostate**

2007

- **There is a rounded 75HU lesion in the renal pelvis on a NECT. Which of the following is most likely?**
 - A. Hematoma
 - B. Stone
 - C. TCC
 - D. Fungal ball

2007

- There is a rounded 75HU lesion in the renal pelvis on a NECT. Which of the following is most likely?
 - A. Hematoma
 - B. Stone
 - C. TCC
 - D. Fungal ball

2007

- **Pt s/p kidney transplant x 1 day with decreased urine output and increasing creatinine-**
 - A. Hyperacute rejection
 - B. Acute rejection
 - C. Accelerated acute rejection
 - D. Chronic rejection
 - E. ATN

2007

- **Pt s/p kidney transplant x 1 day with decreased urine output and increasing creatinine-**
 - A. Hyperacute rejection
 - B. Acute rejection
 - C. Accelerated acute rejection
 - D. Chronic rejection
 - E. **ATN**

ATN

- ATN: usually within 24 hrs; elevated urine sodium, oliguria may begin immediately after transplantation or delayed for few days
- Hyperacute Rejection: minutes after tx
- Accelerated Acute Rejection: first postop week
- Acute Rejection: 1-4 weeks after; low urine sodium, increase Cr, HTN, fever, oliguria, tenderness of tx
 - *Dahnert, Primer p. 300, ACR inservice 2008*

2007

- **1 hour post kidney transplant– a radionuclide renal study shows no uptake,**
 - A. Hyperacute Rejection
 - B. Ureteral Leak
 - C. Accelerated acute rejection
 - D. Acute rejection
 - E. ATN

Hyperacute Rejection

- Within hours after Tx; *emedicine*
- Complete absence of renal perfusion + renal function on Tc-99m DTPA scan (DDx: complete arterial/venous occlusion); *Dahnert*
- Accelerated Acute Rejection: first week

2007

- **What is a cause for small bilateral kidneys?**
 - A. Medullary cystic kidneys
 - B. HIV
 - C. Lymphoma
 - D. Medullary sponge kidney

Medullary cystic kidneys

- Bilateral normal/small kidneys with smooth contour + thin cortex; *Dahnert*
- Nephronophthisis (NPH) and medullary cystic kidney disease (MCKD) refer to 2 inherited diseases with similar renal morphology characterized by bilateral cysts and tubulointerstitial sclerosis leading to end-stage renal disease (ESRD).
- The kidneys are of normal or moderately reduced size, with a smooth outline
- Multiple cysts are typically seen in the medulla and corticomedullary region.
- The cysts range from smaller than 0.5 mm to 2 cm in diameter.
 - *Emedicine; Medullary Cystic Disease*

2007

- In which of the following is there not increased renal cortical echogenicity?
 - A. HIV
 - B. Pyelonephritis
 - C. Chronic glomerulonephritis

2007

- In which of the following is there not increased renal cortical echogenicity?
 - A. HIV
 - B. Pyelonephritis
 - C. Chronic glomerulonephritis

HIV Associated Nephropathy

- Combination of renal insufficiency, nephrotic syndrome, and glomerular changes
- May result in profound hypoalbuminemia although HTN and peripheral edema are characteristically absent
- Striking predominance of male AA pts
- Despite hemodialysis death usually occurs within 6 months
- US
 - 50% will demonstrate normal findings
 - 50% show increased cortical echogenicity with normal sized or enlarged kidneys
 - May see a decrease in renal sinus fat
- CT
 - Global renal enlargement
 - With or without hydronephrosis
 - Cortical scarring
- MRI
 - Nephromegaly
 - Loss of corticomedullary distinction on T1W images has been found as a nonspecific finding

HIV Nephropathy

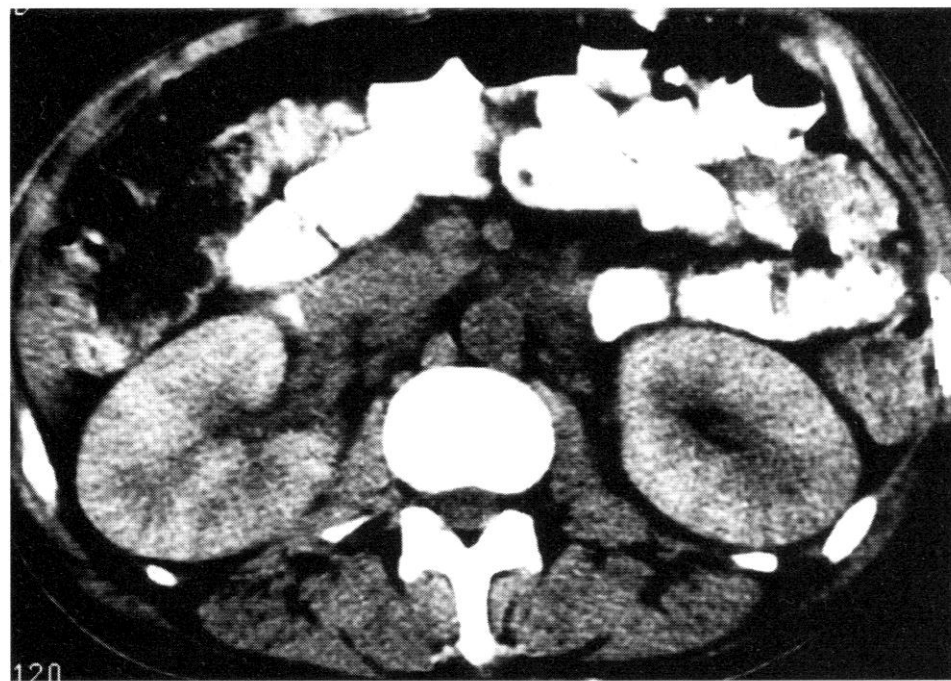


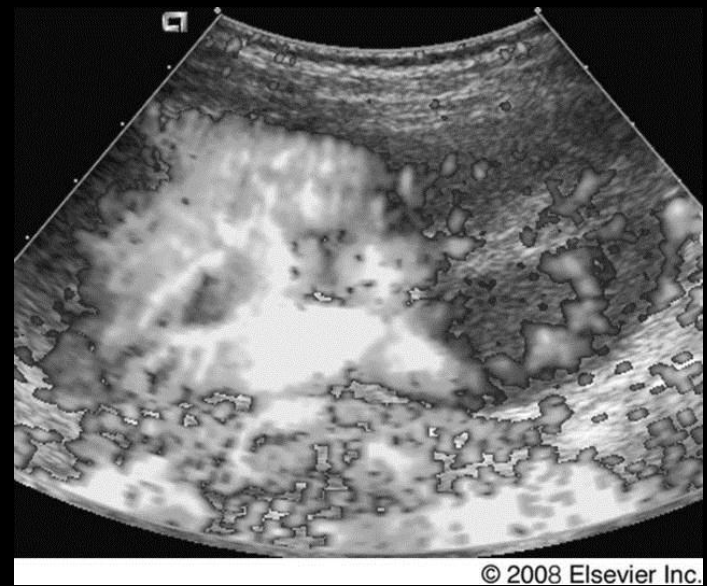
FIGURE 11.14. Human immunodeficiency virus (HIV) nephropathy. Computed tomography (CT) scan demonstrates bilateral nephromegaly and a striated persistent nephrogram in this patient with HIV nephropathy. The contrast medium had been administered 24 hours earlier for a CT scan of the head.

Pyelonephritis

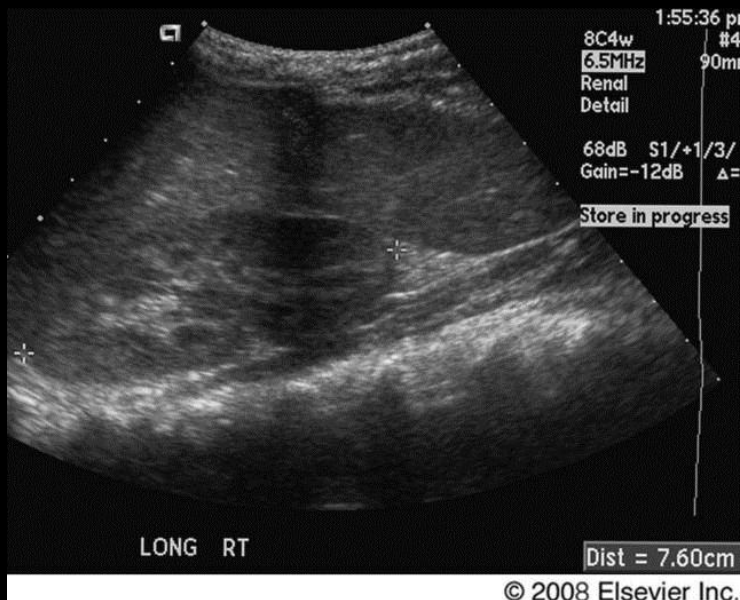
- Majority of kidneys appear normal
- Swollen kidney with decreased echogenicity
 - *Dahnert*
- Sonographic findings in the setting of acute **pyelonephritis include diffuse or local parenchymal swelling, poor corticomedullary differentiation, and decreased perfusion on color Doppler ultrasound.**



Gray-scale ultrasound shows diffuse enlargement of the left kidney, which measures 10.3 cm, and a loss of corticomedullary differentiation.



Power Doppler interrogationshows decreased perfusion to the lower pole of the left kidney.



For comparison, gray-scale, longitudinal ultrasound shows a normal-appearing right kidney, which measures 7.6 cm.

Pyelonephritis

2007

- **What portion of the urethra is most likely to be injured in a straddle injury?**
 - A. Membranous
 - B. Bulbous
 - C. Penile
 - D. Prostatic

Bulbous Urethra

- Type III Urethral Trauma: rupture of proximal bulbous urethra below the urogenital diaphragm (most common injury)
 - *Dahnert*
- Potential areas for injury can be deduced from further study of the urethral anatomy. **The membranous urethra is prone to injury from pelvic fracture** because the puboprostatic ligaments fix the apex of the prostate gland to the bony pelvis and thus cause shearing of the urethra when the pelvis is displaced. The bulbar urethra is susceptible to blunt force injuries because of its path along the perineum.
- **Straddle-type injuries from falls or kicks to the perineal area can result in bulbar trauma.** Conversely, the penile urethra is less likely to be injured from external violence because of its mobility, but iatrogenic injury from catheterization or manipulation can occur, which is also possible in the fossa navicularis.
 - *Emedicine; Urethral Trauma*

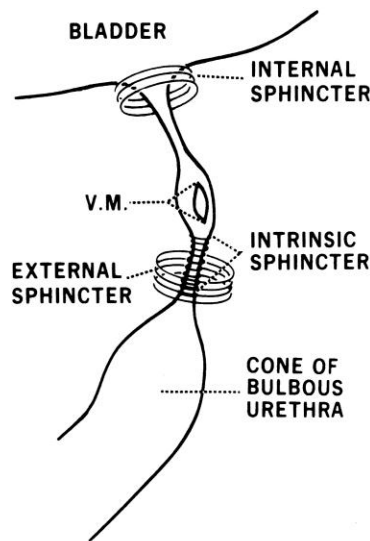


FIGURE 1.6. Diagram of the three urinary sphincters. The internal and intrinsic sphincters are smooth muscle, while the external sphincter is striated voluntary muscle. VM, verumontanum. (From McCallum R. The adult male urethra. *Radiol Clin North Am* 1979;27:227-244, with permission.)

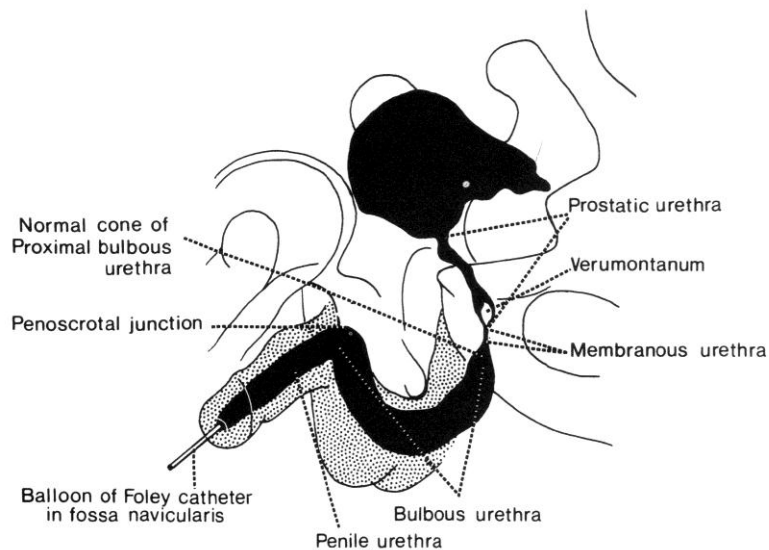


FIGURE 1.4. Diagram of urethra with normal anatomic landmarks. (From McCallum R. The adult male urethra. *Radiol Clin North Am* 1979;27:227-244, with permission.)

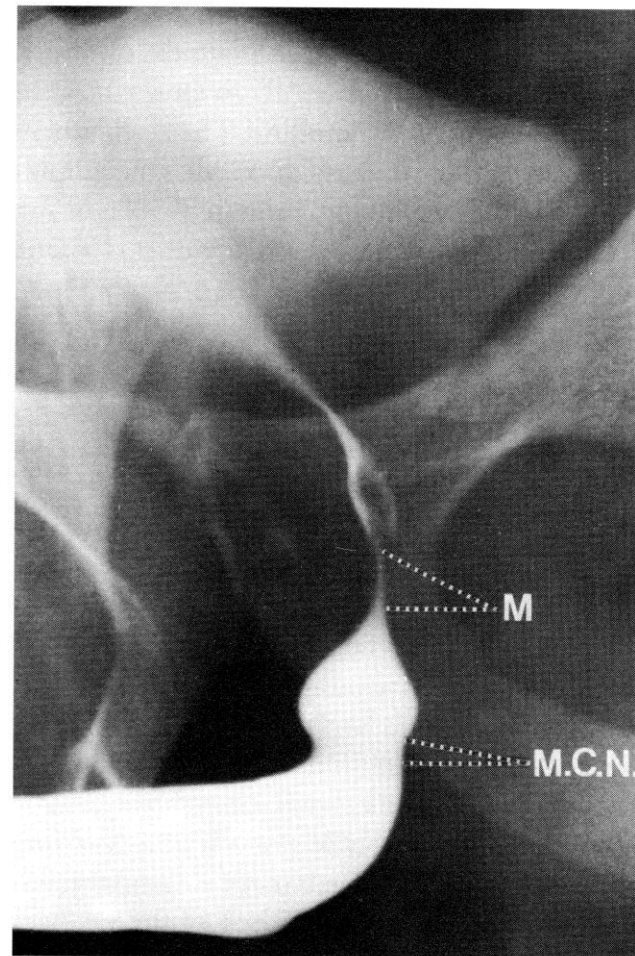


FIGURE 1.5. Dynamic retrograde urethrogram. M, membranous urethra; MCN, musculus compressor nuda. (From McCallum R. The adult male urethra. *Radiol Clin North Am* 1979;27:227-244, with permission.)

- **Regarding urethral stricture**
 - A. Catheter placement assoc w/ stricture at the penoscrotal junction
 - B. Gonococcal infection results in short strictures

Strictures associated with catheterization typically at the penoscrotal junction

- In general, urethral strictures are divided into two main categories:
 - Anterior urethra (from the sphincter [control muscle] to the tip of the penis) includes **penoscrotal junction**.
 - Posterior urethra (from the bladder to the urethral sphincter)
- Strictures that occur in the anterior urethra are usually a result of an injury to the urethra, and its development may not become evident for many months to years. The most common location for a stricture in the anterior urethra is in what's known as the bulbar urethra, which is that part of the urethra that sits just below the pubic bone. "Straddle" injuries, such as falling onto the crossbar of a bicycle, may cause a urethral contusion ("bruising") to occur, and a stricture develops as these injuries heal.
- Other causes include injury from placement of a catheter, trauma from endoscopes or foreign bodies, and sexually transmitted diseases (STDs). STDs cause intense inflammation of the urethra and the surrounding tissues, causing urethritis. Left untreated, this inflammation may result in scarring or stricture formation. Prompt diagnosis and treatment of urethritis reduces the risk of subsequent stricture formation

- Catheter-associated strictures are due to pressure necrosis and most commonly affect penoscrotal junction (70-80%) because this junction is one of the fixation points of the urethra. The suspensory ligament fixes the urethra at this level and the membranous urethra is fixed by the urogenital diaphragm. Inflammation or superimposed infection may extend proximally and distally, resulting in a long, irregular stricture – centered at the penoscrotal junction.
- Strictures may also be due to the lack of or inadequate treatment of gonococcal infection. The result is a hard fibrous scar, centered at the bulbous urethra (70%). Infection may spread proximally and distally to the scar, resulting an irregular, long segment stricture (*b is not true*). Gonococcal strictures are responsible for 40% of urethral strictures. Strictures may also occur after pelvic trauma. Specifically, post-traumatic posterior urethral strictures may develop after partial or complete urethral tears. Post-traumatic anterior urethral strictures are associated with straddle injuries. They are centered at the proximal bulbous urethra, but typically involve a short segment.

2007

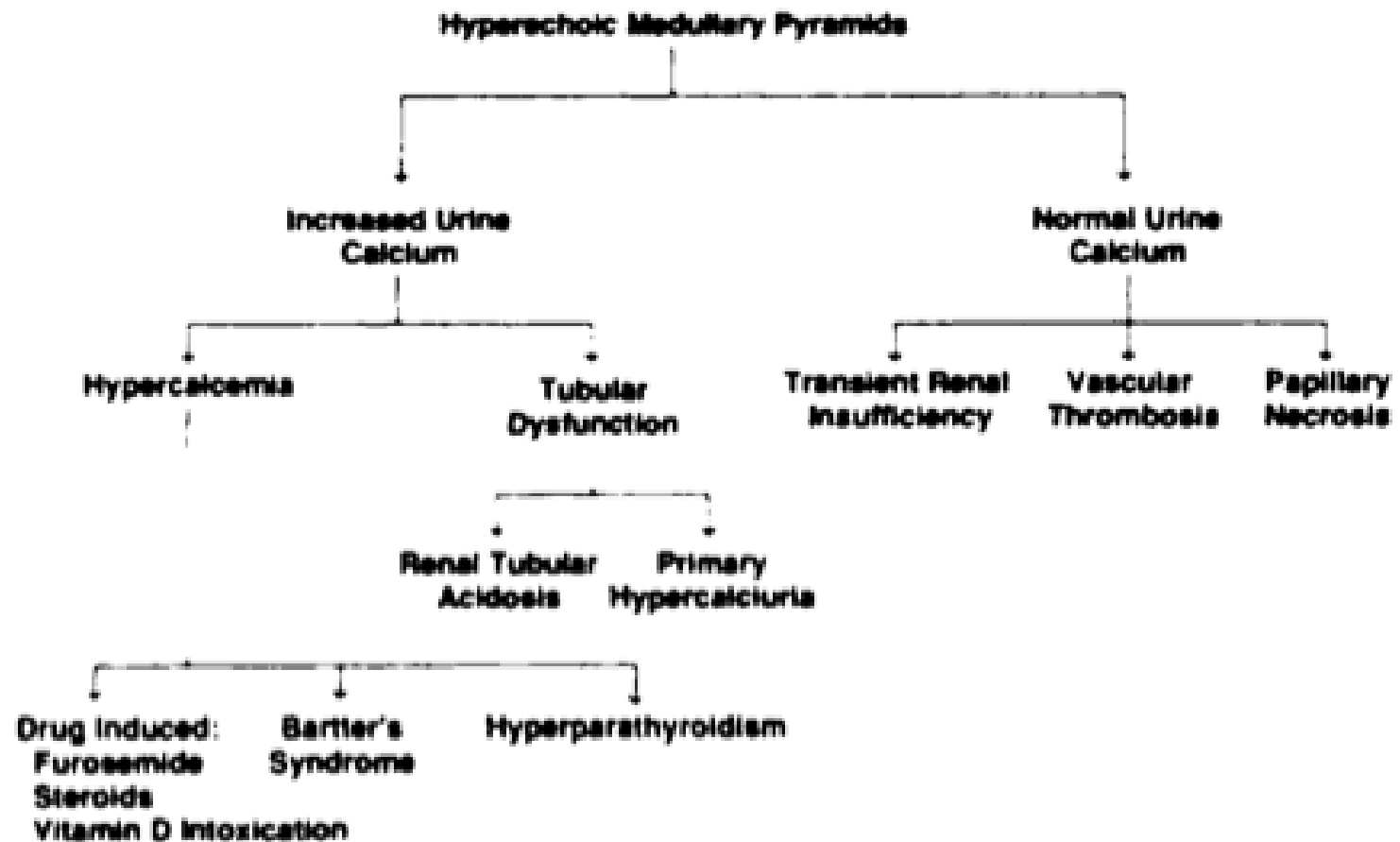
- **Pt with B pubic rami fractures and a suprapubic mass, no blood at the urethral meatus – what next?**
 - A. Cystoscopy
 - B. Cystogram
 - C. IVP
 - D. RUG

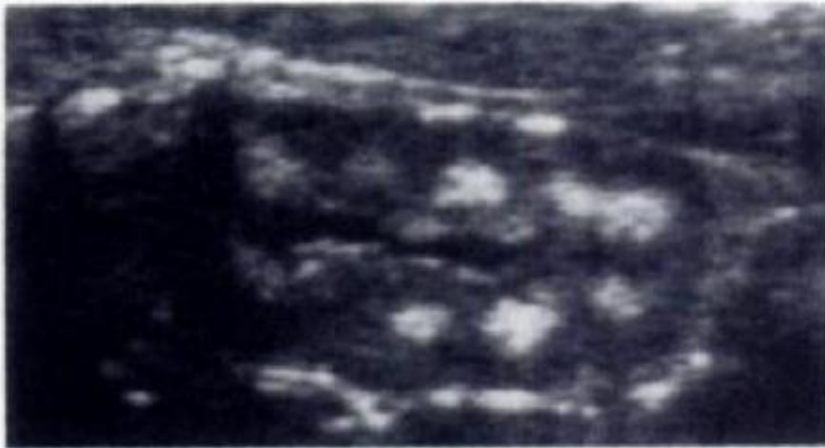
- **B. Retrograde urethrogram.**

- The reported incidence of urethral injury in pelvic fractures is 4 to 17%. The single most important clinical sign of urethral injury is blood at the external meatus. Even without blood at the meatus, certain types of urethral injuries are possible (Type I for instance). No attempt should be made to pass a catheter until the urethral injury is assessed by dynamic retrograde urethrography. A cystogram should be performed after a negative RUG and after the foley has been advanced. IVP and angiograms are not indicated to assess urethral function. However, in the setting of trauma, if the patient is unstable and a pelvic arterial injury is suspected, an angiogram can be performed with possible embolization (Dunnick, Sandler Textbook of Uroradiology page 317). *Bone and Joint Imaging. 2nd. ed. Resnick, pp. 793-5; Campbell's Operative Orthopedics. 9th ed. vol. 3, p. 2434.*
- ***Dähnert 5th 975, 979; GU Reqs 237-238***
- Inarguably, RUG is the standard of reference for diagnosis of urethral injury. The trauma protocol for treatment of patients with pelvic fractures dictates performance of RUG before placement of a Foley catheter. In most cases, this protocol is followed before the patient is brought to the CT suite. However, there are instances, such as a very busy emergency department with multiple trauma patients arriving simultaneously and issues of availability of the CT scanner or portable radiography equipment, when CT may be performed prior to RUG and placement of a Foley catheter
 - *CT Signs of Urethral Injury; Radiographics*

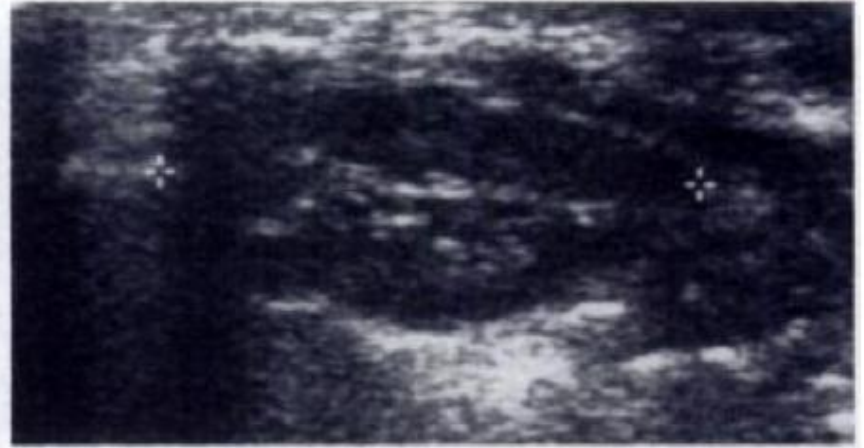
2007

- **What is not associated with hyperechoic renal pyramids?**
 - A. RTA
 - B. Fanconi Syndrome
 - C. Lasix administration
 - D. Elevated serum calcium
 - E. Prune Belly





a.



b.

Figure 4. (a) Longitudinal US scan reveals strikingly increased echogenicity of the medullary pyramids in a 2-year-old child with Bartter syndrome. (b) Longitudinal image of the kidney (between cursors) following therapy with indomethacin. Echogenicity is reduced.

Hyperechoic Pyramids

- Normal Medullary Pyramids in children, particularly in infants are hypoechoic when compared with the renal cortex
- Hyperechoic medullary pyramids in Adults
 - Hyperuricemia, GOUT
 - Medullary Nephrocalcinosis
 - Medullary sponge kidney
 - Hypercalcemia
 - RTA
 - Papillary Necrosis
 - TB
 - Hyperoxaluria
 - Chronic Furosemide Use
 - Clinical conditions that result in hypokalemia, such as primary hypoaldosteronism
- Can be seen as a complication of long term furosemide therapy in preterm infants
- Pediatric cases of Bartter Syndrome
- Transient Findings in Term Infants with Oliguria
- Other clinical entities known to cause nephrocalcinosis in pediatric patients include:
 - RTA
 - Cretinism
 - Oxalosis
 - Steroid Administration

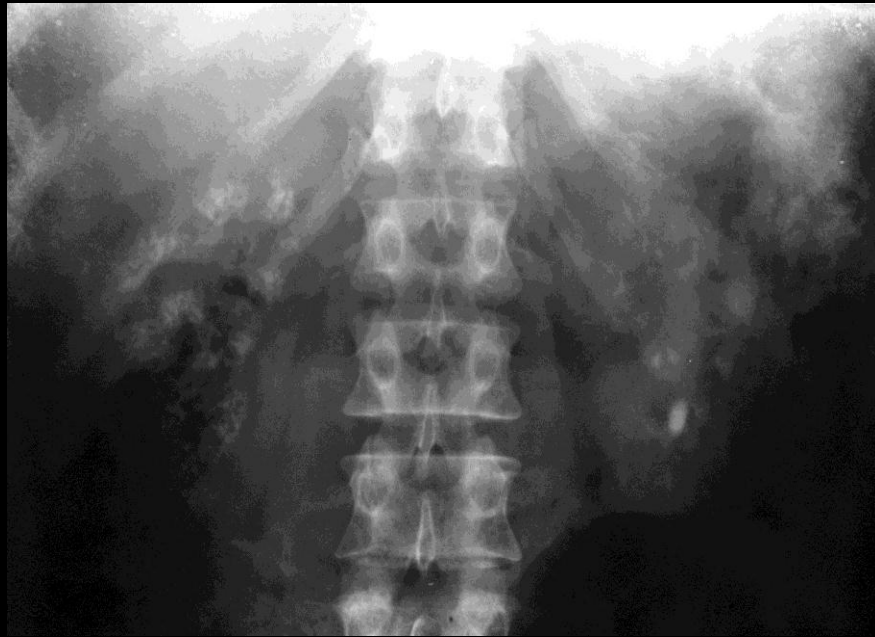
Prune Belly

- **Prune Belly Key Features**

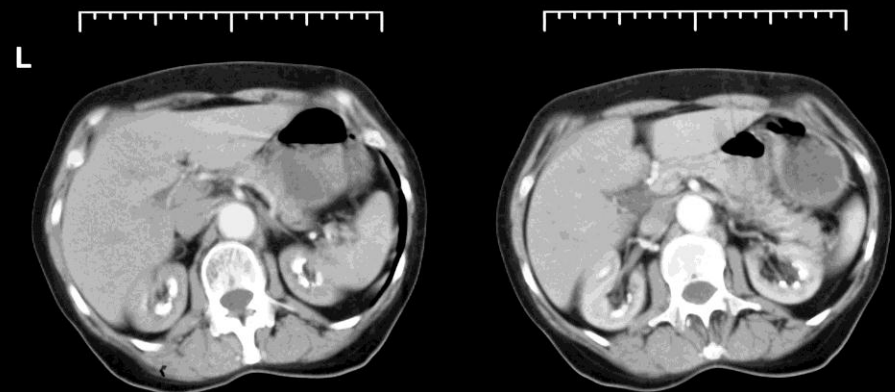
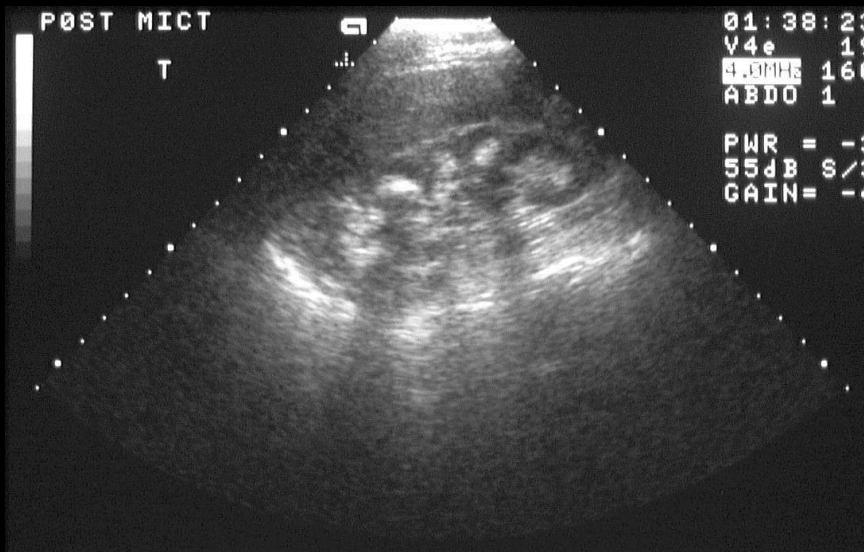
- Hydroureteronephrosis is often to a severe degree; however, the calyceal morphology may be well preserved.
- Proximal portion of the ureters has more normal muscle than the distal portions
- The bladder is large with pseudodiverticulum at the urachus and a wide bladder neck opening into a dilated prostatic urethra
- Dysplastic Kidney to varying degree

- **Fanconi Syndrome** (also known as Fanconi's syndrome)

- is a disorder in which the [proximal tubular](#) function of the [kidney](#) is impaired, resulting in decreased reabsorption of [electrolytes](#) and [nutrients](#) back into the [bloodstream](#).
- Compounds involved include [glucose](#), [amino acids](#), [uric acid](#), [phosphate](#) and [bicarbonate](#).
- The reduced reabsorption of [bicarbonate](#) results in type 2 or proximal [renal tubular acidosis](#),
- *Wikipedia*



- **Medullary Nephrocalcinosis** kidneys show bilateral pyramidal calcification, which is consistent with nephrocalcinosis,
- **Nephrocalcinosis.** Sonogram of the right kidney in a woman with nephrocalcinosis shows hyperechoic foci in the pyramids



2007

- **What is associated with renal agenesis?**
 - A. Ipsilateral seminal vesicle cyst

Ipsilateral seminal vesicle cyst

- *Seminal Vesicle Cyst with Ipsilateral Renal Agenesis; AJR*

Seminal Vesicle Cyst with Ipsilateral Renal Agenesis

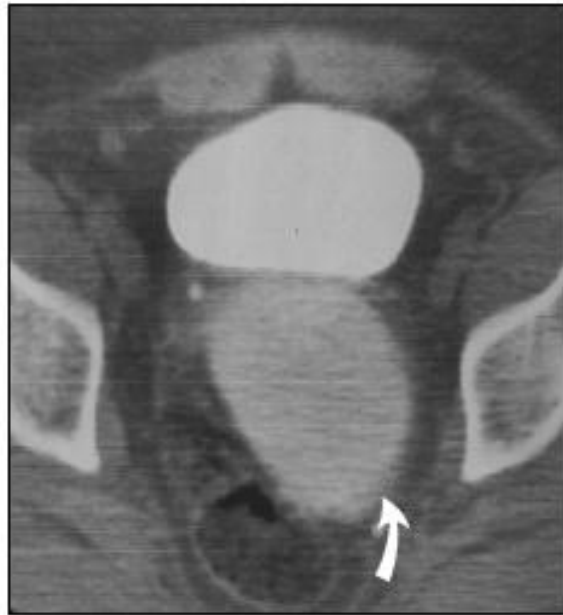


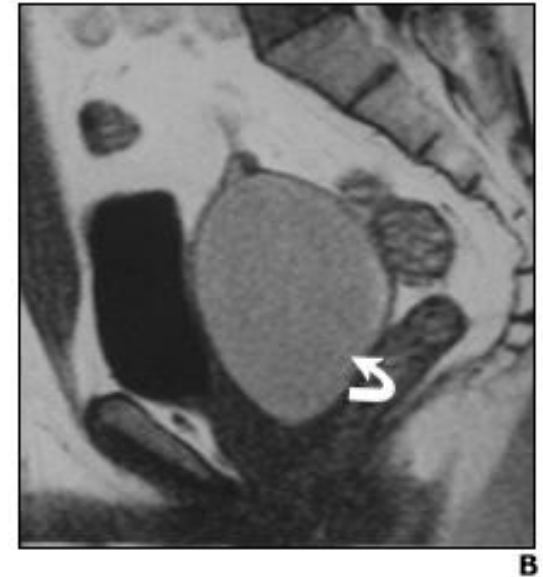
Fig. 3.—30-year-old man with primary infertility. Axial CT scan of pelvis shows large 7-cm oval homogenous hyperdense mass (*arrow*) arising from left seminal vesicle posterior to bladder.



Fig. 4.—38-year-old man with dysuria; frequency; nocturia; hematuria; hematospermia; lower abdominal, perineal, and ejaculatory pain; and primary infertility.

A. Excretory urogram shows solitary left kidney with normal left renal collecting system and bladder.

B. Enhanced sagittal T1-weighted MR image of pelvis shows large round well-defined mass (*arrow*) arising from base of prostate gland, with mass effect on bladder and colon. Signal intensity is greater than that of urine, suggestive of hemorrhage or increased protein content.



2007

- **How does ovarian cancer spread?**
 - A. Local invasion to adjacent pelvic structures
 - B. Hematogenously, to lung
 - C. Hematogenously, to liver
 - D. Peritoneal seeding
 - E. Lymphatics

D. Peritoneal seeding

- Ovarian carcinoma can spread by local extension, lymphatic invasion, intraperitoneal implantation, hematogenous dissemination, and transdiaphragmatic passage. Intraperitoneal dissemination is the most common and recognized characteristic of ovarian cancer.
 - *Emedicine; Ovarian Cancer*

2007

- **Patient has complex renal mass on U/S. Which of the following findings on CT will allow to you conservatively manage this patient with follow-up only.**
 - a. presence of septations
 - b. a small non-enhancing cystic portion of the mass
 - c. CT attenuation of -65
 - d. thick rim of calcification
 - e. a CT biopsy demonstrating oncocytes

2007

- Patient has complex renal mass on U/S. Which of the following findings on CT will allow to you conservatively manage this patient with follow-up only.
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 - c. CT attenuation of -65**
 - d. thick rim of calcification
 - e. a CT biopsy demonstrating oncocytes

2007

- **A neonate demonstrates a solid renal mass**
 - A. Mesoblastic nephroma
 - B. Wilms
 - C. RCC
 - D. Oncocytoma

Mesoblastic nephroma

- Mesoblastic nephroma is the most common renal tumor identified in the neonatal period and the most frequent benign renal tumor in childhood; *emedicine*
 - 3mos mean age at presentation
 - Usually solid but may produce multiple cystic spaces
 - No venous extension (DDx from Wilms Tumor)
 - Usually no herniation into renal pelvis (DDx from MLCN)
 - Calcifications rare
 - *Dahnert*

Wilms Tumor

- Mc renal malignancy in children
- Accounts for 8% of all childhood malignant tumors
- Aka- nephroblastoma
- Peak incident- approx 3 years
 - 80% of cases detected btw 1-5 yrs
- Mc presents as an asymptomatic abdominal mass but may present with abdominal pain
- Association btw the development of Wilms tumor and overgrowth disorders (congenital hemihypertrophy, Beckwith-Wiedemann syndrome), sporadic aniridia, and other malformations.
- Bilateral in 5%
- Invasion of the renal vein and extension into the renal vein or IVC occurs commonly
- 20% will have pulmonary metastatic disease
- US
 - Large, well defined mass arising from the kidney
 - Typically increased echogenicity
 - May show heterogeneity related to area of intratumoral hemorrhage, necrosis, or calcification
- Eval with CT- check for lymph node involvement, liver and lung mets, involvement of the contralateral kidney by a synchronous Wilms tumor, the anatomic distribution of the intrarenal tumor, involvement of the renal vein or IVC, relationship of the path of the ureters to the mass
- Displaces blood vessels
- Grows “in a ball”
- If crosses midline usually goes anterior to the aorta

Nephroblastomatosis

- Rare entity
- Persistence of nephrogenic rests within the renal parenchyma
- Precursors of Wilms tumor
- Most pts with nephroblastomatosis are monitored with US or MRI
- Nephrogenic rests are nonenhancing
- MRI nephrogenic rests
 - Appear as a plaque like peripheral renal lesions
 - May be confluent
 - Wilms tumor is suggested when a spherical appearing lesion demonstrates an interval increase in size OR when it demonstrates progressively increasing inhomogeneous enhancement

Multilocular Cystic Nephroma

- Rare type of cystic mass containing multiple septa
- Lesions have an unusual distribution in that they affect mainly young boys and adult women
- Present as painless abdominal mass
- Do not contain malignant cells
- Can be difficult to differentiate from a well differentiated Wilms tumor on imaging
- US, CT and MRI
 - Lesions appear well circumscribed
 - Multiseptated mass
- Tx: surgical resection since imaging cannot differentiate benign from malignant

Mesoblastic Nephroma

- Aka fetal renal hamartoma
- Most common renal mass encountered in neonates
- Typically, it is encountered during the first few months of life with a mean age at diagnosis of approximately 3 months
- Most commonly present with a nontender palpable abdominal mass
- Lesion consists of benign spindle type cells
- US
 - Mixed echogenic mass that is intrarenal in location
 - Indistinguishable from Wilms tumor
- CT
 - A solid intrarenal mass with variable enhancement

TABLE 6–2. Differentiating Features Between Neuroblastoma and Wilms Tumor

Feature	Neuroblastoma	Wilms Tumor
Age	Most common in children <2 yr	Peak incidence at 3 yr
Calcification	Calcifications common (85% on CT) and stippled	Calcifications uncommon (15% on CT) and often curvilinear or amorphous
Growth pattern	Surrounds and engulfs vessels	Grows like ball, displacing vessels
Relation to kidney	Inferiorly displaces and rotates kidney	Arises from kidney, claw sign
Lung metastasis	Uncommon	More common (20%)
Vascular invasion	Does not occur	Invasion of renal vein, inferior vena cava

CT = computed tomography.

2007

- **Question regarding treatment of varicocele**
 - A. permanent (coils)

Permanent (coils)

- Most commonly all abnormal veins are tied permanently to prevent continued abnormal blood flow by surgical approach
- Percutaneous embolization represents the least invasive means of varicocele repair. The internal spermatic vein is accessed primarily via cannulation of the femoral vein through a retrograde approach with subsequent balloon and/or coil occlusion of the varicocele. The advantages of percutaneous embolization include preservation of the testicular artery and the relatively noninvasive nature of the technique. However, the percutaneous approach can be fraught with troublesome access to the vein, and postoperative complications such as contrast allergies, arterial injury, thrombophlebitis, and coil migration are uncommon but tangible risks. This approach is often reserved for recurrent varicoceles after open surgical repair.
 - emedicine
- Jugular approach favored and use of steel coils
 - *AJR*

**Percutaneous Venography
and Occlusion in the
Management of Spermatic
Varicoceles**

2007

- **MCDK is associated with which of the following?**
 - A. Contralateral UPJ obstruction
 - B. Contralateral MCDK

Contralateral UPJ obstruction

- MCDK associated with renal anomalies of contralateral side in 20-50%
 - **UPJ (7-27%)**
 - Horseshoe Kidney (5-9%)
 - Ureteral Anomalies (5%)
 - Renal Hypoplasia (4%)
 - Vesicoureteral Reflux
 - Malrotation
 - Renal Agenesis

- **MRI spectroscopy of the prostate demonstrates increased citrate**
 - A. Normal- contains low levels of choline and increased citrate
 - B. BPH- increased citrate
 - C. Cancer- decreased citrate and increase in choline, elevated choline levels or an elevated ratio of choline to citrate detected on MRS is an indicator of malignancy, Higher choline-to-citrate ratios are associated with more aggressive tumors.
 - D. prostatitis

BPH

- In vivo MR spectroscopy of the prostate can be performed with a high level of technical success with use of decreased citrate levels and increased choline levels as diagnostic markers of carcinoma in the prostate.
- *Radiology*

Three-dimensional H-1 MR Spectroscopic Imaging of the in Situ Human Prostate with High (0.24–0.7-cm³) Spatial Resolution¹

tervention (17). On average, BPH nodules contain higher levels of glandular cells than are found in the normal central gland, which explains the significant increase in citrate in BPH of the central gland (17).

2007

- **Pt with prostate cancer has a PSA of 4 and a single focus of increased tracer uptake at L4 on bone scan**
 - A. Met
 - B. DJD

DJD

- In asymptomatic patients presenting with well or moderately differentiated prostate cancer and PSA levels of less than 10 to 15 ng/mL, the likelihood of bone mets is low. Unless there is focal bone pain, a scan is not indicated.

– *Mettler 252*

- **With what condition is sonohysterosalpingography contraindicated?**
 - A. Endometritis
 - B. Active bleeding
 - C. Poor visualization of the endometrium with endovaginal US
 - D. Endometrial polyp

Endometritis

- Contraindications for HSG are active pelvic inflammatory disease, recent uterine or tubal surgery, active uterine bleeding, pregnancy and hypersensitivity to the contrast medium.
- <http://medinfo.psu.ac.th/smj2/173/smj1736.html>

2007

- **Most common site of paragangliomas**
 - A. Lumbar plexus
 - B. Sacral plexus

Answer: lumbar sympathetic chain

- The organ of Zuckerkandle is the most common site of occurrence of an extra-adrenal paraganglioma. It is located near the origin of the IMA and the abdominal aortic bifurcation, i.e. it is sympathetic fibers along the anterior abdominal aorta. Occurs in 30-45 yo usually. Female>male. It is more malignant than other paragangliomas and usually secrete excess catecholamines. They are positive on MIBG nucs study.
- Additional common locations of extra-adrenal paragangliomas: carotid body tumor, jugular bulb (glomus jugulare), middle ear (glomus tympanicum), nodose ganglion of the vagus nerve (glomus vagale). These usually have a female predominance except for the carotid body tumor.
- On MRI paragangliomas are: “salt and pepper” in appearance related to the flow voids associated with the neovascularity of the tumor. Iso on T1 and hyperintense on T2 with avid early enhancement. Can be associated with bone destruction.
- Pheo's: Rule of 10's= 10% bilateral, 10% extra-adrenal, 10% malignant, and 10% familial
- Pheo's assoc with MEN II, VHL, NF-1
- Pheo's are very bright on T2 MRI and are usually positive on MIBG
 - *(Brigham Radiology case Presentation, June 23, 2003 and Brandt and Helms pg. 775 and AFIP: Retroperitoneum/Dr. Woodward)*

- **60 year old male with painless, hypoechoic testicular mass, most likely cause**
 - A. Lymphoma
 - B. Seminoma
 - C. Sarcoidosis
 - D. Leydig Cell tumor

Lymphoma

- Most common testicular cancer in patients > 60 years of age
 - Primer; p. 328

2007

- Decreased resistance in interlobar renal artery is seen in all except:
 - A. Pyelonephritis
 - B. Hydronephrosis
 - C. AVM

2007

- Decreased resistance in interlobar renal artery is seen in all except:
 - A. Pyelonephritis
 - B. Hydronephrosis
 - C. AVM

2007

- Patient has had surgery with vaginal septum resected and now has bilateral complex cystic ovarian masses:
 - A. Bilateral dermoids
 - B. Peritoneal inclusion cysts
 - C. Endometriosis
 - D. PCOS

2007

- Patient has had surgery with vaginal septum resected and now has bilateral complex cystic ovarian masses:
 - A. Bilateral dermoids
 - B. Peritoneal inclusion cysts
 - C. **Endometriosis**
 - D. PCOS

2007

- A mildly enlarged transplant kidney on ultrasound is least likely due to? (N)
 - A. Renal vein thrombosis
 - B. Renal artery thrombosis
 - C. Obstruction
 - D. Pyleonephritis
 - E. AV fistula

Renal artery thrombosis ?

- I think they mean renal artery stenosis because this definitely does not increase the size of the kidney and renal artery thrombosis is very uncommon.

2006

2006

- **A 56 year old male with a history of prostate cancer now has a retroperitoneal soft tissue mass which encases, but does not displace the adjacent mesenteric vessels. The soft tissue is dark on both T1 and T2 weighting. What is the most likely diagnosis?**
- A. Lymphoma
- B. Prostate metastases
- C. Mesenteric fibrosis

Mesenteric (Retroperitoneal) fibrosis

- The Lancet
- Volume 367, Issue 9506, 21 January 2006-27 January 2006, Pages 241-251
- **Retroperitoneal fibrosis** encompasses a range of diseases characterised by the presence of a fibro-inflammatory tissue, which usually surrounds the abdominal aorta and the iliac arteries and extends into the retroperitoneum to envelop neighbouring structures—eg, ureters. Retroperitoneal fibrosis is generally idiopathic, but can also be secondary to the use of certain drugs, malignant diseases, infections, and surgery

2006

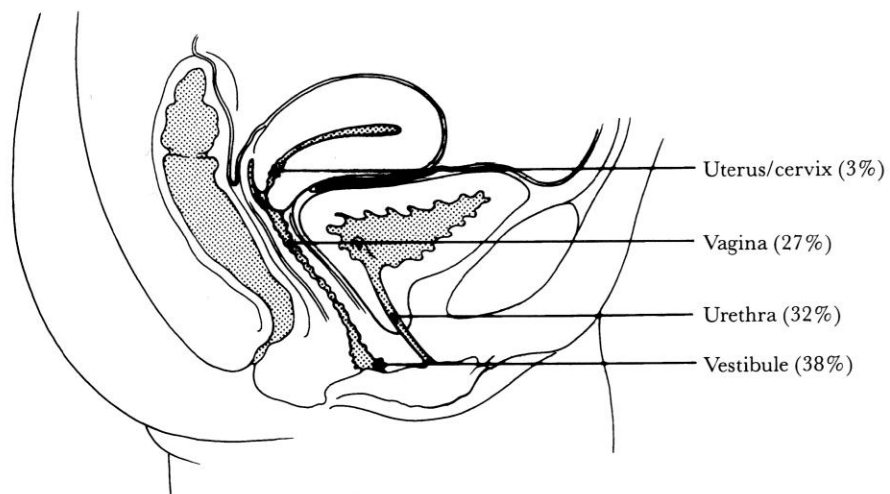
- **A boy has an ectopic ureter. Which is true?**
 - A. It most commonly presents with enuresis
 - B. It is associated with a duplicated collecting system
 - C. It would have reflux if insertion is into the bladder neck
 - D. It is more common in boys
 - E. Recurrent UTI's/epididymitis

Recurrent urinary tract infections (common in males) (recurrent epididymitis)

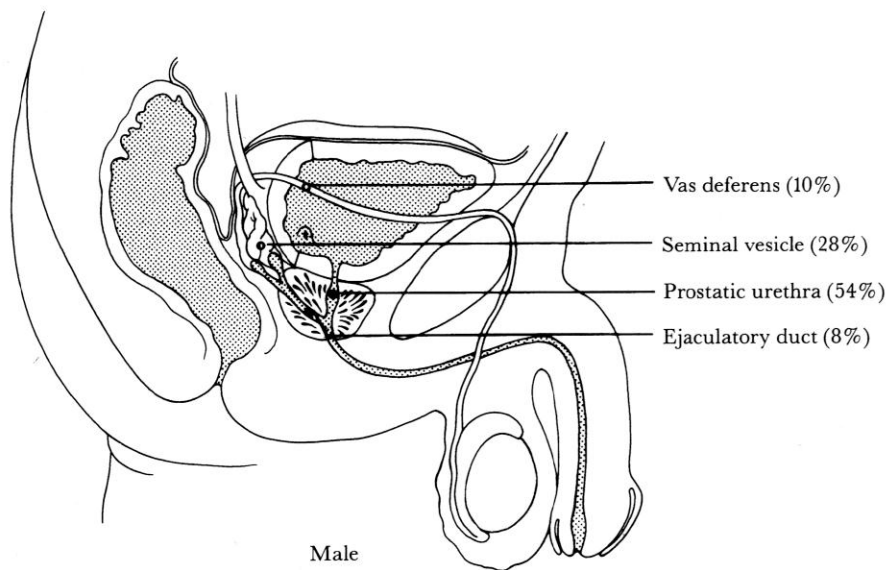
- females, more than 80% of ectopic ureters drain duplicated systems. In males, most ectopic ureters drain a single system
- Ectopic ureters occur more frequently in females than in males (by a ratio of 6:1).
- Consider ectopic ureteral insertion in prepubertal boys who have a history of recurrent epididymitis. Postpubertal males with ectopic ureters most commonly present with complaints of chronic prostatitis and painful intercourse and ejaculation.
 - *Emedicine; Megaureter and other Congenital Ureteral Anomalies*

Ectopic Insertion of the Ureter

- Extravesical ectopic insertion of upper pole moiety ureter
 - Males: above external sphincter →→ continent
 - Females: majority outside sphincter control →→ dribbling incontinence
- Associated with complete duplication is ectopic insertion of the ureter draining the upper pole
- Typically, the insertion is extravesicle in location, resulting in obstruction and possible dysplasia of the upper pole moiety
- More than 2/3s of all extravesical ectopic ureteral insertions are associated with complete duplication
- In Females- may have ectopic insertion at sites of remnants of the embryonic mesonephric duct including walls of the vagina, uterus and broad ligaments
- In males ectopic insertion of the ureter into the vas deferens and seminal vesicles is easily explained by the fact that these organs are derived from the mesonephric duct, which also gives rise to the ureter
- Ectopic ureters terminating outside the urinary tract tend to obstruct the upper pole moiety
- The more distal the ectopic orifice, the more dysplastic the upper moiety it drains
- Extravesical ectopic ureters in females are commonly beyond sphincter control, resulting in continual dribbling incontinence of urine.
- In males , a typical clinical presentation is chronic or recurrent epididymitis due to ectopic insertion of the ureter into the ipsilateral vas deferens or seminal vesicle.
- Urographic Findings range from an easily visualized dilated upper pole collecting system to complete nonvisualization of the upper moiety.
- The presence of a nonfunctioning upper pole collecting system often can be inferred from the appearance of the visualized lower moiety. In these cases, the lower collecting system will usually exhibit reversal of its normal axis, fewer than the normal # of calyces expected for a nonduplicated kidney and lateral deviation of the proximal ureter due to the medial location of the dilated ureter from the nonfunctioning upper pole. The appearance of the lower collecting system has been termed the “dropping lily” sign
- In pts in whom a nonfunctioning obstructed upper moiety is suspected, US typically shows an echo free cystic area in the medial upper pole of the kidney. This represents the dilated upper collecting system, and its dilated ureter often can be traced distally to its insertion

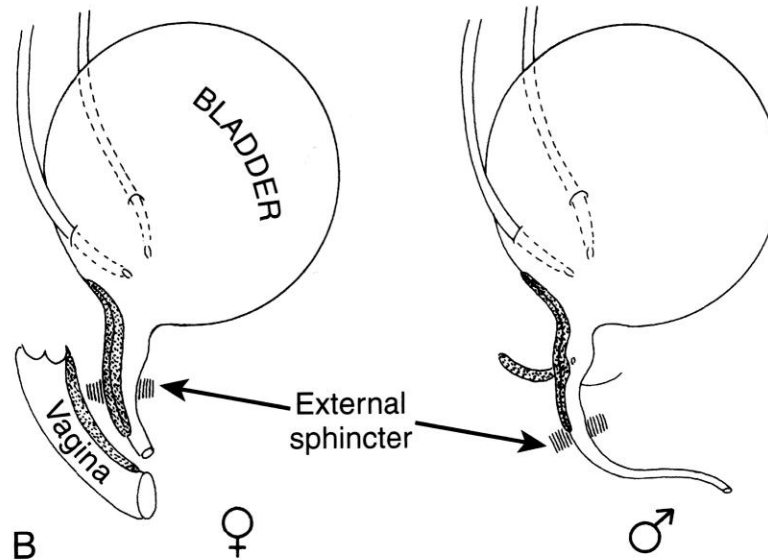
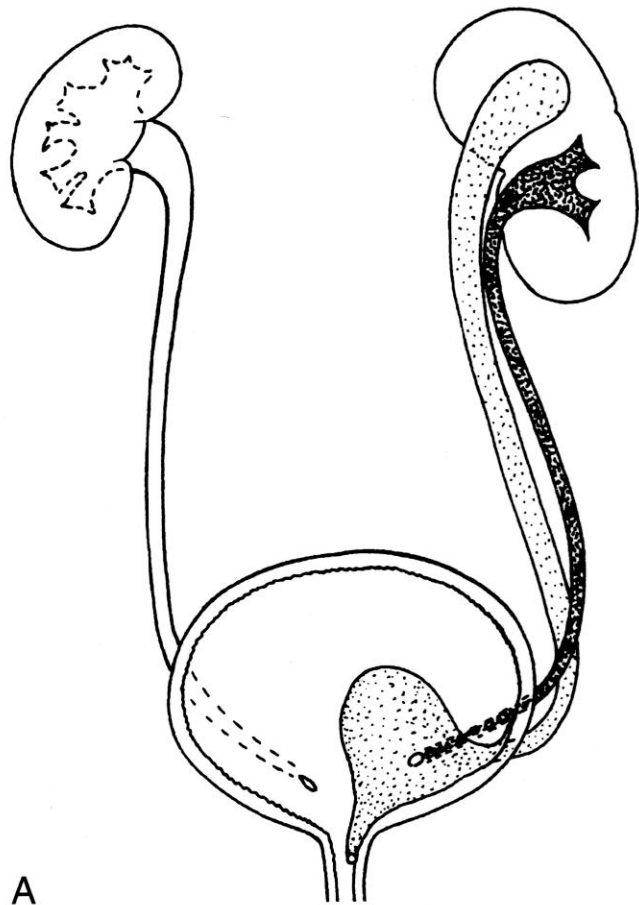


Female



Male

FIGURE 2.28. Sites of extravesical insertions of the upper moiety ureter in completely duplicated collecting systems. (From Amis ES Jr, Newhouse JH. *Essentials of uro radiology*. Boston: Little, Brown & Co, 1991:261, with permission.)



Weigert Meyer Rule

The Upper Pole ureter inserts medially and caudally to the ipsilateral normal ureteric orifice and is often associated with a ureterocele

2006

- **Which entity is not associated with diverticula of the bladder?**
 - A. Bladder outlet obstruction
 - B. Stones
 - C. Congenital
 - D. Schistosimiasis

D. Schistosomiasis

- Hutch diverticulum: congenital weakness of musculature near UVJ
 - Usually associated with reflux
- Acquired diverticulum in bladder outlet obstruction
 - Usually multiple
 - Not associated with reflux
 - Complications
 - Infection
 - Calculi
 - Tumor
 - *Primer; p.306*

2006

- **A 30 year old infertile patient is being treated with beta-HCG. On CT, she has multiple ovarian cystic lesions and ascites. What is the most likely diagnosis?**
 - A. Polycystic ovary disease
 - B. Ovarian hyperstimulation syndrome
 - C. Ovarian torsion
 - D. Ectopic pregnancy
 - E. Corpus luteum cyst

B. Ovarian hyperstimulation syndrome

- Typically begins 3-10 days following BhCG administration
- Symptoms: lower abdominal pain, weight gain, ascites, DIC, [rare severe side effects: renal failure, hypotension, death]

2006

- **Which phase of imaging is best to evaluate renal tumors?**
 - A. Corticomedullary phase
 - B. Arterial phase
 - C. Nephrogenic phase

C. Nephrogenic phase

- Therefore, obtaining contrast-enhanced images during the nephrographic phase of enhancement, which results in a homogeneous nephrogram, is necessary because renal mass detection and the ability to demonstrate enhancement in hypovascular neoplasms is maximized.
- For examinations performed with a single–detector row helical CT scanner, contrast-enhanced imaging only during the nephrographic phase (by using a scanning delay of 90 seconds) is performed
 - *How I Do It: Evaluating Renal Masses1*
 - *Gary M. Israel, MD and Morton A. Bosniak, MD*
 - *Radiology*

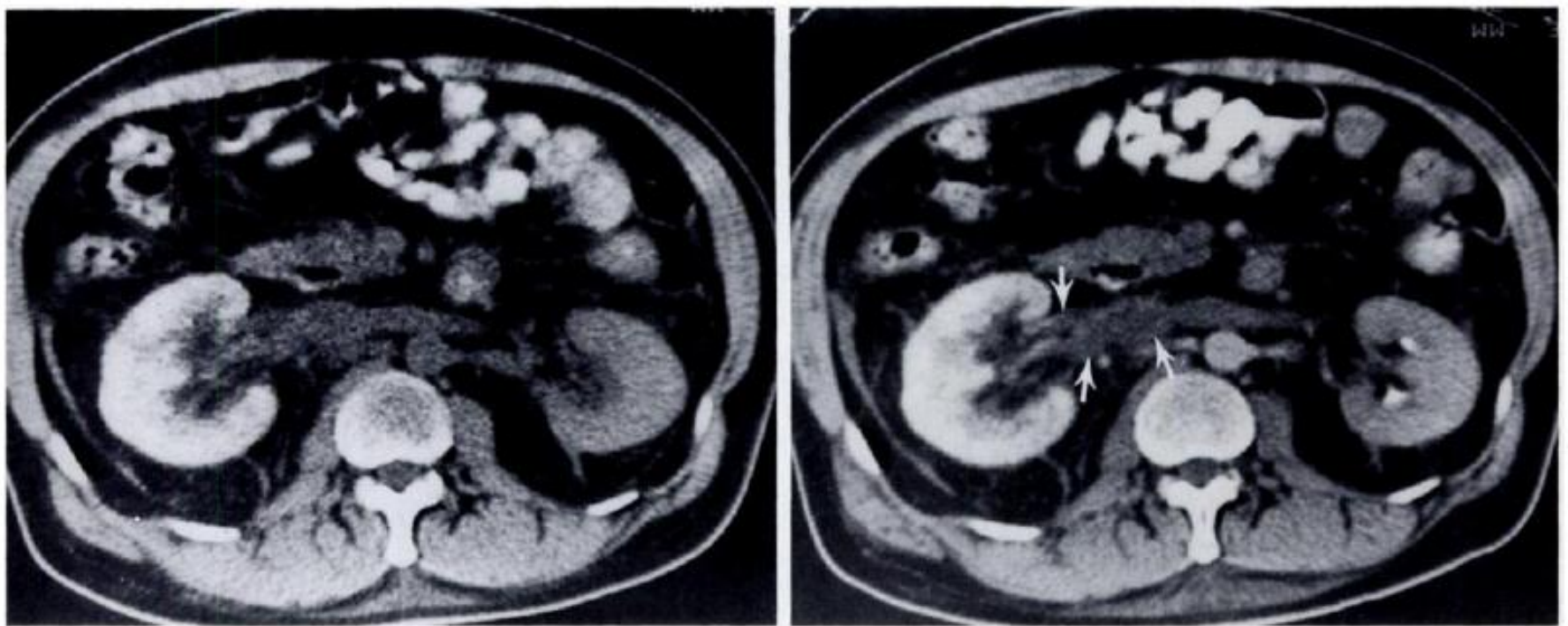
2006

- **A 30 year old post-partum woman has acute L flank pain with fever. A contrast-enhanced CT demonstrates increased enhancement of the left kidney. The left kidney is also enlarged. The next day, a non-contrast CT shows persistent enhancement of the left kidney. What is the likely cause of the problem?**
 - A. ATN
 - B. Renal vein thrombosis
 - C. Acute pyelonephritis
 - D. Chronic atrophic pyelonephritis

– B. Renal vein thrombosis

- *Radiology*

Renal Vein Thrombosis in Patients with Nephrotic Syndrome: CT Diagnosis¹



a.

b.

Figure 3. Acute RVT. (a) Unenhanced CT scan obtained 1 day after intravenous urography shows marked retention of contrast material in the renal parenchyma of the right kidney. (b) CT scan obtained after injection of contrast material shows distended right renal vein and IVC, both containing clot (arrows). Note persistent corticomedullary discrimination with ill-defined corticomedullary edges; inhomogeneous parenchymal enhancement and absent pyelocalyceal visualization; and thickened Gerota fascia and perirenal "whiskering."

2006

- **Which of the following is not associated with an increased risk of Wilms tumor?**
 - A. Beckwith-Wiedemann syndrome
 - B. Hereditary aniridia
 - C. Hemihypertrophy

Hereditary aniridia

- Wilm's Tumor Associations
 - Sporadic Aniridia (35% will get Wilm's tumor)
 - Hemihypertrophy
 - Drash Syndrome: pseudohermaphroditism, glomerulonephritis and Wilms' tumor
 - Beckwith-Wiedemann Syndrome: macroglossia, omphalocele, visceromegaly
 - Primer; p. 840

2006

- **Which is a CT sign of urolithiasis?**
 - A. Comet tail sign
 - B. Tissue rim sign
 - C. Perinephric hemorrhage
 - D. Lucent center
 - E. Seminal vesicle displacement

B. Tissue rim sign

- soft-tissue "rim" sign for differentiation of ureteral calculi from phleboliths on unenhanced helical computed tomographic
 - *Radiology; Soft Tissue Rim Sign*

Box 5-13 CT Signs of a Ureteral Stone

Primary

Homogeneous density in ureter lumen

Secondary

Unilateral hydronephrosis

Unilateral hydroureter

Unilateral perirenal stranding

Unilateral periureteral stranding

Unilateral nephromegaly

Kidney stones

Unilateral loss of white renal pyramids



Comet Tail Sign

Indicates that the calcification is a phlebolith rather than a stone

Describes a calcification with a linear band of soft tissue extending eccentrically from One side of the calcification. The ST band represents the vein containing calcified thrombus

2006

- **Ovarian follicles rupture at**
 - A. 10mm
 - B. 20mm
 - C. 30mm
 - D. 40mm

B. 20mm

- When estradiol is produced in excess of 150 pg/mL and this level is maintained for 48 to 50 hours, an LH surge is induced and ovulation occurs. This usually happens when the lead follicle reaches 22 to 24 mm in diameter.
 - *Ovulation After Controlled Ovarian Hyperstimulation; medscape*

2006

- **An adrenal mass is present in a patient with a known lung cancer. On noncontrast CT it measures 30 HU, after contrast is given, it measured 65HU. On delayed imaging it measured 42 HU. What is it most likely?**
 - A. Adenoma
 - B. Pheochromocytoma
 - C. Metastases
 - D. Inconclusive

A. Adenoma

- If the attenuation is $>10\text{HU}$, the mass is considered indeterminate and enhanced and delayed 15min image is obtained. If enhancement is $>50\%$ especially if the delayed attenuation is $<35\text{HU}$ a diagnosis of lipid poor adenoma is made w/o further evaluation.
- If the enhancement washout is less than about 50%, the mass is considered indeterminate.
- If the patient has a new extraadrenal primary neoplasm with no other evidence of mets, a bx is recommended to confirm mets.
- Small Cell : 90% of adrenal masses represent mets
- NSCL: 60% of adrenal masses are metastases
 - *Primer; p. 317-318*

2006

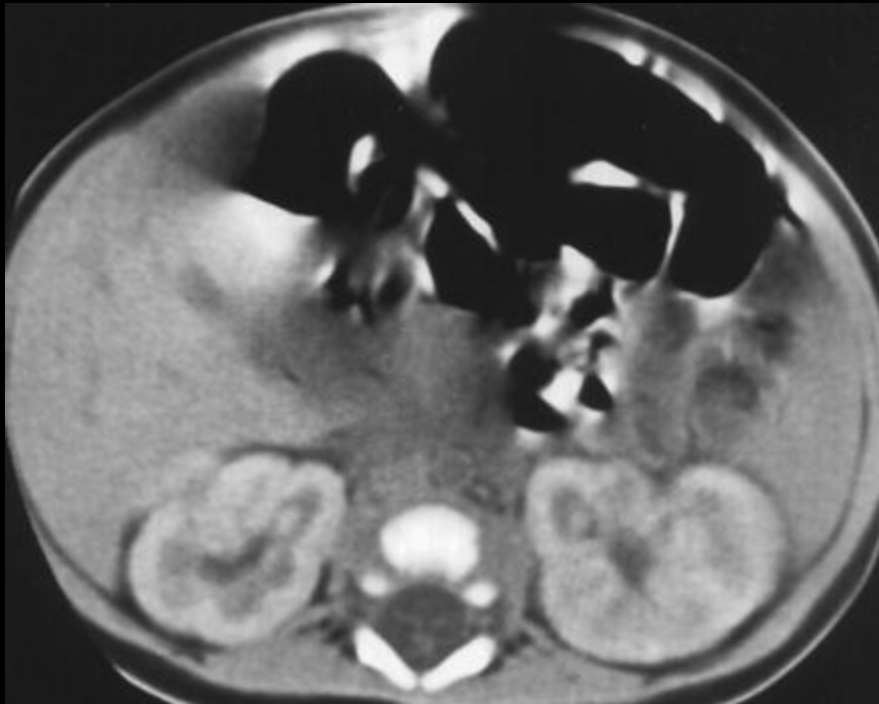
- $\% \text{Relative washout} = (\text{Enhanced Attenuation} - \text{delayed Attenuation}) / \text{Enhanced Attenuation}$
- $\% \text{ Enhancement washout} = (\text{enhanced Attenuation} - \text{delayed Attenuation}) / (\text{enhanced Attenuation} - \text{unenanced Attenuation})$
- $\% \text{ Relative washout} > 40\% = \text{adenomas}$
- $\% \text{ enhancement washout} > 60\% = \text{adenomas}$
 - *<http://www.chestx-ray.com/StagingLungCa/Adrenal.html>*

2006

- **A 32 year old female has a hyperechoic cortex (cortical nephrocalcinosis is a variant recall) in the kidney. What is the most likely cause?**
 - A. Hyperparathyroidism
 - B. Hyperthyroidism
 - C. Chronic glomerulonephritis
 - D. Renal tubular acidosis

C. Chronic glomerulonephritis

- patients with chronic renal failure have small shrunken kidneys (usually < 10 cm in length) with thinned, hyperechoic cortex
 - *Merck manual Online*
 - *Primer; p. 351*



enhanced CT and US



2006

- **A male with chronic renal failure on hemodialysis has generalized osteopenia without subperiosteal resorption. What is the most likely cause?**
 - A. Hyperparathyroidism
 - B. Aluminum toxicity
 - C. Amyloid

B. Aluminum toxicity

- Chronic Kidney Disease patients with prolonged exposure to aluminum-based phosphate binders and those with diabetes mellitus have lower blood levels of PTH than other patients with comparable levels of kidney function.
- Aluminum deposition in bone, secondary to aluminum overload, interferes with bone mineralization. Therefore, low-turnover and/or adynamic bone disease may be more prevalent in these patients.

2006

- **A postmenopausal female with bleeding and an endometrial thickness less than 4 mm most likely has:**
 - A. Endometrial cancer
 - B. Endometrial polyp
 - C. Endometrial atrophy
 - D. Submucosal leiomyoma
 - E. Adenomyosis
 - F. Endometrial hyperplasia

C. Endometrial atrophy

- Medpix

2006

- **The most common etiology of a UPJ obstruction is:**
 - A. Intrinsic abnormality
 - B. Duplication
 - C. Abnormal ureteral insertion
 - D. Crossing vessel

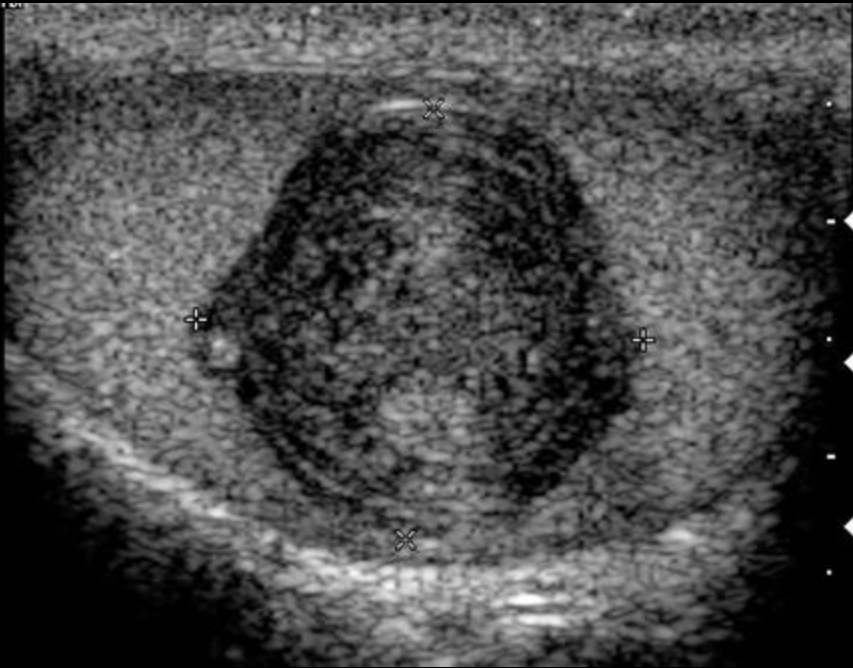
A. Intrinsic abnormality

- Partial replacement of UPJ muscle by collagen
- Abnormal arrangement of junction muscles causing dysmotility (69%)
 - *Dahnert*

2006

- **Which statement is associated with an epidermoid of the testis?**
 - A. It has the appearance of hypo- and hyperechoic concentric rings on ultrasound
 - B. It is amenable to transscrotal biopsy
 - C. It is premalignant and requires orchiectomy
 - D. On ultrasound there is increased through transmission with an echogenic focus

A. It has the appearance of hypo- and hyperechoic concentric rings on ultrasound



- Longitudinal US images of the right testis show a well-circumscribed intratesticular mass (cursors) in the lower medial aspect of the testis. The mass contains alternating rings of hyperechogenicity and hypoechogenicity and has a slightly echogenic center. The surrounding testis is normal.

- **Epidermoid Cyst** of the Testis:
Radiologic-Pathologic Correlation1 ;
Radiographics

2006

- **A 25 year old male with a 1 year history of nephritic syndrome (also recalled as glomerulonephritis) presents with flank pain and gross hematuria. CT revealed an enlarged kidney and delayed enhancement. What is the diagnosis?**
- A. Renal vein thrombosis
- B. Pyelonephritis
- C. Renal artery stenosis
- D ATN
- E. A renal calculus with obstruction

Renal Vein Thrombosis

- Gross hematuria, Flank pain
- Exaggerated and prolonged corticomedullary differentiation
- Smooth enlargement kidney
- Associated with “TEST MAN”
 - Thrombophlebitis
 - Enterocolitis (dehydration)
 - Sickle Cell Disease, SLE
 - Trauma
 - Membranous Glomerulonephritis
 - Amyloidosis
 - Neoplasm
- *Dahnert, emedicine*

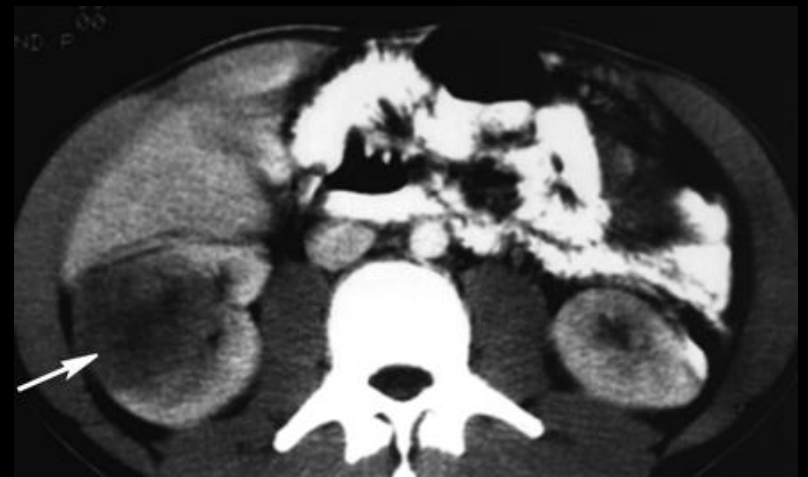
2006

- **Patients with sickle cell trait are at increased risk for which of the following renal tumors?**
 - A. Renal medullary carcinoma
 - B. Angiomyolipoma
 - C. Transitional cell carcinoma
 - D. Oncocytoma
 - E. Renal cell carcinoma
 - F. Juxtaglomerular apparatus tumor

A. Renal medullary carcinoma

- A unique feature of this tumor is the strong association with sickle cell trait.
- In young patients with sickle cell trait, an infiltrative renal mass with associated retroperitoneal adenopathy and caliectasis are characteristic findings of renal medullary carcinoma on CT and MRI.

Renal Medullary Carcinoma: CT and MRI Features;AJR



2006

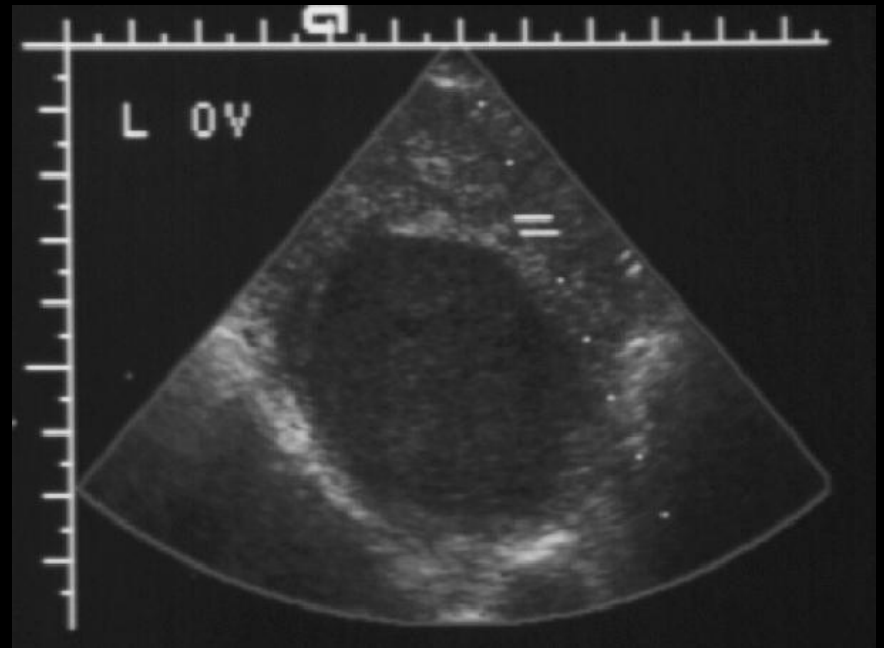
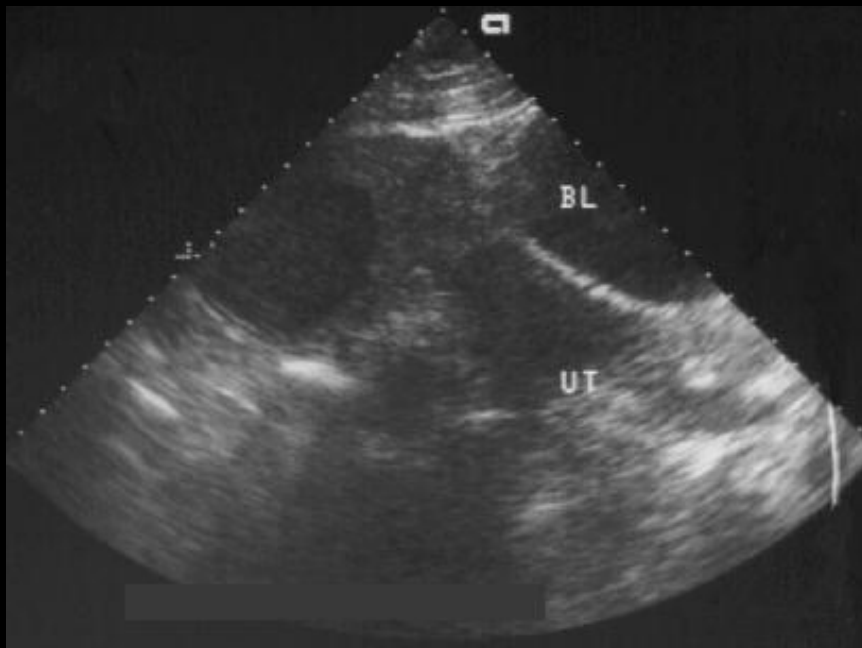
- **Regarding ovarian torsion:**
 - A. It is often associated with malignancy
 - B. Doppler flow excludes torsion
 - C. It is most commonly seen in postmenopausal woman
 - D. There is ovarian enlargement
 - E. It is more common in left ovary versus the right

D. There is ovarian enlargement

- Usually affects prepubertal girls, may occur prenatally, increased risk during pregnancy
- US
 - Markedly enlarged
 - Absence of Doppler waveforms (only seen in 20%, venous flow is first compromised resulting in edema and swelling)
- Causes
 - Enlarged ovary (large cyst/tumor, paraovarian cyst)
 - Hypermobility of adnexa (more frequent in younger children + during pregnancy), excessively long mesosalpinx, tubal spasm
 - *Dahnert*

Ovarian Torsion

- There is marked enlargement of the left ovary, which measures 8x6x5 cm in diameter (Fig.1). Within the center of the ovary, a homogenous mass measuring 5x5x4 cm is identified (Fig. 2). Of note, despite multiple attempts, no Doppler flow could be identified in the ovary
- Diagnosis: Ovarian Torsion with hemorrhagic cyst
- Uhrad.com



2006

- **A hysterosalpingogram shows an enlarged, distorted uterine cavity. Which entity is most likely?**
 - A. Blood clots
 - B. Polyp(s)
 - C. Intrauterine pregnancy
 - D. Asherman's
 - E. Uterine fibroid

E. Uterine fibroid

- Distortion and enlargement of the uterine cavity with fibroid; *AJR*

**Hysterosalpingography Before
and After Myomectomy: Clinical
Value and Imaging Findings**

2006

- **On fetal ultrasound, a fetus demonstrates a hypoechoic region in the upper pole of the left kidney. This most likely represents:**
 - A. Simple cyst
 - B. Ureteral obstruction w/ dilated calyx
 - C. ARPKD
 - D. ADPKD
 - E. Duplication of the collecting system with a dilated upper pole calyx
 - F. Mesoblastic nephroma
 - G. Multicystic dysplastic kidney

E. Duplication of the collecting system with a dilated upper pole calyx

- Duplication of the renal collecting system is a common abnormality that is usually unilateral
- Duplication should be suspected when US demonstrates hydronephrosis that is significantly different between the two poles or hydronephrosis that affects only the upper pole.
 - *Atlas of US in OBGYN*
- The duplex kidney appears as 2 central echo complexes with intervening renal parenchyma. Hydronephrosis at one pole is suggestive of a duplex kidney. Although hydronephrosis can occur at either pole, it is more common in the upper one
 - *emedicine*

TOSHIBA

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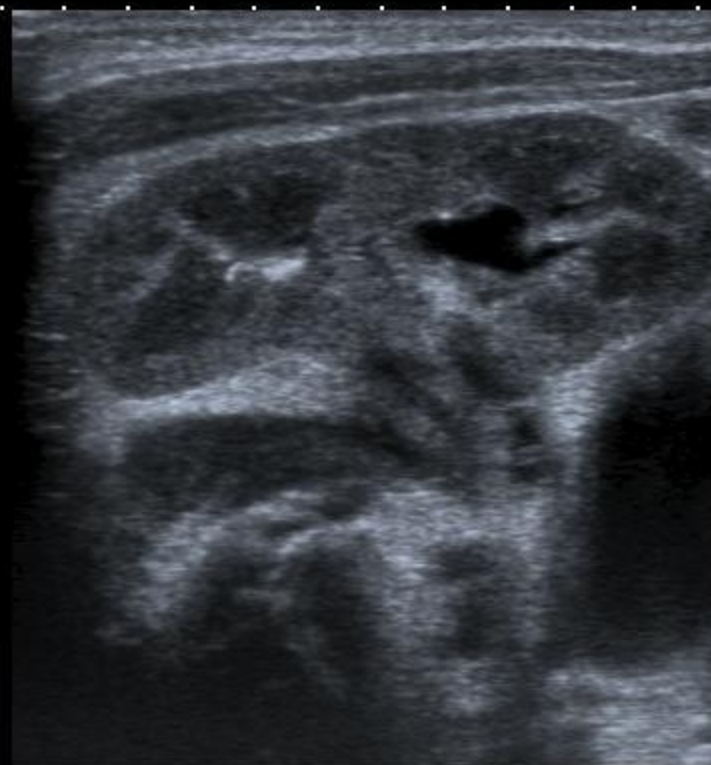
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2006

- **Regarding percutaneous treatment of renal artery stenosis, which is true?**
 - A. Ostial lesions are easier to treat
 - B. Hypotension is a complication
 - C. 90% of patients no longer require anti-hypertensive medication after the procedure
 - D. 30% risk of vessel rupture when treating FMD
 - E. Should not be performed if renin levels don't lateralize.

B. Hypotension is a complication

- Based on the following study, 90% of pts had their HTN improve but they were not cured. Therefore the best answer is hypotension is a complication. See next slide.
- In the Univ. of Virg. Series, 94% of 65 HTN patients with atherosclerotic lesions were helped by the procedure. For patients with FMD, "...90% will improve." *Castañeda synopsis p. 200* Recognized complications of renal angioplasty (in 5-10%): renal insufficiency (contrast); subintimal dissection; renal artery thrombosis; renal artery rupture; distal embolization; renal artery spasm; and hematomas at the puncture site. Note that while hypotension may certainly occur post-procedure [it is recommended that the patient be observed for 48 hours because "drastic blood pressure changes may occur"] this is not an accepted "complication". *Castañeda synopsis p. 200* Success is much lower in true ostial lesions. Initial technical success rate is 80-90%. Therapeutic success (favorable BP results is also high, especially in FMD (90-100%) but somewhat lower in atherosclerotic disease (70-90%). (*Primer 606, 636 and Old questions*). Note that while renal vein renin sampling might be helpful, it is only 75-80% sensitive [fails to lateralize in 20-25%]. [*InterNet*]
- ***Valji 162-165***

- *AJR*

Percutaneous Transluminal Dilatation of the Renal Artery: Follow-up Studies on Renovascular Hypertension

avoid the adverse affects of dehydration on the kidneys. Antihypertensive drugs are discontinued the day of the procedure to avoid the precipitous fall in blood pressure that may accompany a successful dilatation.

Of the 58 patients, 12 (20%) were cured, 38 (65%) were improved, and eight (14%) were unchanged (table 2). All of the patients with fibromuscular disease were either cured or improved. Although 84% of those patients with atherosclerotic stenosis benefited from the procedure, a much smaller proportion were cured.

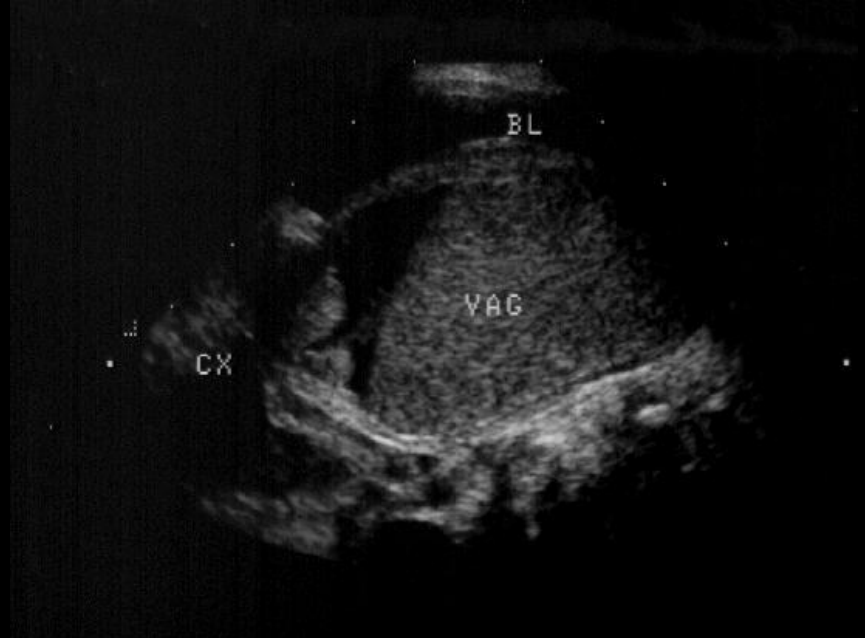
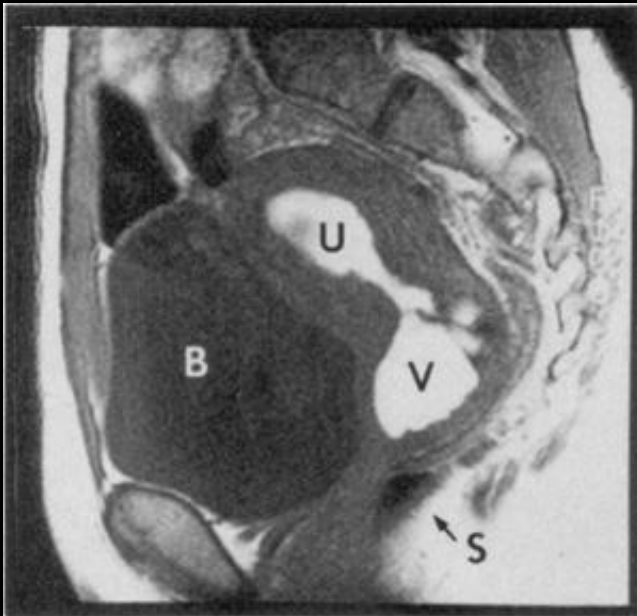
2006

- **What is the most likely diagnosis in a one day old female with mass between the bladder and rectum?**
 - A. Hydrometrocolpos
 - B. Sacrococcygeal teratoma
 - C. Neuroblastoma
 - D. Rhabdomyosarcoma

A. Hydrometrocolpos

Obstructed Uterovaginal Anomalies: Demonstration with Sonography

- *Radiology*
- Hydrometrocolpos with debris in the vagina



2006

- **On CT, a renal mass has a density of 64 HU prior to contrast administration. After contrast, the lesion measures 64 HU. On delayed imaging, the lesion measures 64 HU. What is the most likely diagnosis?**
 - A. Lymphoma
 - B. Renal cell carcinoma
 - C. Hemorrhagic cyst
 - D. Simple Cyst
 - E. Angiomyolipoma

2006

- On CT, a renal mass has a density of 64 HU prior to contrast administration. After contrast, the lesion measures 64 HU. On delayed imaging, the lesion measures 64 HU. What is the most likely diagnosis?
 - A. Lymphoma
 - B. Renal cell carcinoma
 - C. Hemorrhagic cyst**
 - D. Simple Cyst
 - E. Angiomyolipoma

2006

- **Regarding urethral stricture**
 - A. Catheter placement assoc w/ stricture at the penoscrotal junction
 - B. Gonococcal infection results in short strictures

A. Catheter placement assoc w/ stricture at the penoscrotal junction

- Gonococcal: bulbar urethra; multiple and serial
- Catheter/iatrogenic: penoscrotal junction
- Trauma: solitary and short, after complete rupture, bulbous urethra
- Neoplasm: stricture rarely sole manifestation

2006

- **How do you differentiate HIV nephropathy from other renal disease on US?**
- A. Size
- B. Echogeneity

A. Size

- Global enlargement of both kidneys
 - *Dahnert*
- HIV nephropathy presents with large or normal kidneys and the patients do have renal failure. However, the kidneys are very echogenic and there are no renal masses.
 - *ACR inservice*

2006

- **A 30year old female with bleeding. HSG shows a 3cm pedunculated lesion in the endometrial cavity. On MRI, the lesion is hypointense with T1 and T2 weighting. What is the most likely diagnosis?**
 - A. Leiomyoma
 - B. Adenomyosis
 - C. Polyp
 - D. Cancer
 - E. Hyperplasia

A. Leiomyoma

- Sharply margined homogenous focal area of low/intermediate signal intensity on T1 and T2
- Occasionally high signal intensity on T2WI from hemorrhage / hyaline degeneration or in highly cellular leiomyoma or leiomyoma with edema

– *Dahnert*

2006

- **Man with a seminal vesicle cyst and empty right renal fossa. What is the most likely cause?**
 - A. Congenital abnormality (e.g. Renal agenesis)
 - B. Renal dysplasia
 - C. Horseshoe kidney
 - D. Undescended testes

2006

- **Man with a seminal vesicle cyst and empty right renal fossa. What is the most likely cause?**
 - A. **Congenital abnormality (e.g. Renal agenesis)**
 - B. Renal dysplasia
 - C. Horseshoe kidney
 - D. Undescended testes

2006

- **What is the most common risk factor for placenta accreta?**
 - A. Prior c-section
 - B. Multiple gestations
 - C. Prior molar pregnancy
 - D. Prior IUD
 - E. Pelvic inflammatory disease

A. Prior c-section

- Placenta Accreta: underdeveloped decidualization with chorionic villi growing into myometrium
- PA in 24% after 1 c-section, in 48% in >2 c-sections
- **Placenta accreta** is an abnormal adherence of the placenta to the uterine wall. Invasion of the uterine wall by the placenta is referred to as *placenta increta*, and penetration of the uterine wall is *placenta percreta*. The decidua basalis and retroplacental complex of veins are completely or partially absent. Failure of the abnormally adherent placenta to separate completely from the myometrium after delivery results in copious hemorrhage. **Risk factors include prior cesarean section, prior placenta accreta, and prior placenta previa.** Scarring of the uterus results in the defective formation of decidua. US findings include absence of normal vascular channels in the retroplacental region, increased echogenicity of tissues deep to the placenta, and visualization of retroplacental vessels within the bladder lumen. Placenta previa is usually also present

2006

- **Regarding the endometrial stripe:**
 - A. It is best imaged in coronal plane
 - B. Its measurement should include the surrounding hypoechoic region
 - C. Fluid within the cavity is malignant
 - D. Tamoxifen leads to increased thickness with cystic changes

D. Tamoxifen leads to increased thickness with cystic changes

- *Tamoxifen-induced Uterine Abnormalities: The Role of Imaging¹; Radiology*

Sagittal endovaginal US image shows the most common endometrial finding in women undergoing tamoxifen treatment: a thickened endometrium (arrows) punctuated by cysts (*). A benign polyp was found at sampling.



2006

- **2 days following transplant, there is reversal of diastolic flow in a segmental renal artery. This is most likely due to:**
 - A. ATN
 - B. Renal Artery Stenosis
 - C. Renal Vein Thrombosis
 - D. Acute Rejection
 - E. Urinary Obstruction

C. Renal Vein Thrombosis

- “U-shaped”/plateau like reversal of diastolic arterial flow in RVT
 - *Dahnert*

2006

- **An excretory urogram shows unilateral swelling of the interureteric ridge. What is the most likely etiology?**
 - A. Cancer
 - B. Obstructing stone
 - C. Soft tissue mass

B. Obstructing stone

- *AJR*

RADIOLOGIC FEATURES OF THE INTERURETERIC RIDGE*

ferred to as the "interureteric ridge." The interureteric ridge thus encompasses the distal ends of the ureters and forms the boundary of the widest portion (base) of the trigone of the urinary bladder.

The illustrative cases have shown that roentgenographic changes due to edema and inflammation about the ureteral orifice and adjacent interureteric ridge are useful in the diagnosis of ureterovesical junction calculus or operative trauma. This is true

2006

- An infertile women treated with human chorionic gonadotropin develops abdominal pain and distension, ascites, and pleural effusions. Ultrasound reveals enlarged ovaries with multiple cysts. What is the most likely etiology?
 - A. Cirrhosis
 - B. Ovarian hyperstimulation syndrome
 - C. Meig's syndrome

Ovarian hyperstimulation syndrome

- **Ovarian hyperstimulation is a complication of hormonal treatment.**
- Ovaries enlarge and contain multiple lutein cysts; more common with pergonal than with Clomid therapy.
- Typically begins 3-10 days following BHCG admin.
- Lasts 6-8 weeks.
- Symptoms: Low abd pain, wgt gain, ascites, DIC; sever side effects(rare): renal failure, HTN, death.

2006

- A patient with long standing nephrotic syndrome develops left flank pain, hematuria, and an enlarged kidney. What is the most likely etiology?
 - A. Renal vein thrombosis
 - B. Ureterolithiasis
 - C. Renal cell carcinoma
 - D. Obstruction

Renal vein thrombosis

- **Renal vein thrombosis and hypercoagulability in nephrotic syndrome**
- Patients with the nephrotic syndrome are at increased risk for venous thrombosis, particularly deep vein and renal vein thrombosis (DVT and RVT)

2006

- What is the appearance of the kidney with autosomal recessive polycystic kidney disease?
 - A. Multiple medium to large cortical cysts
 - B. Enlarged echogenic kidney
 - C. Small echogenic kidney

Enlarged echogenic kidney

- ***Autosomal recessive polycystic kidney*** disease usually presents in the neonate and is detectable in the fetus. The condition is bilateral, relatively symmetric, and characterized by marked enlargement of the kidneys and occasionally the liver. Affected patients have a combination of cystic renal disease and hepatic fibrosis. The disease runs a spectrum from severe renal disease at birth (infantile polycystic disease) to relatively mild renal disease with development of hepatic fibrosis and liver failure in childhood (juvenile polycystic disease). The primary defect in the kidneys is diffuse dilatation of the collecting tubules. Early prognosis depends on the number of abnormal nephrons. Most infants who present in renal failure die in the neonatal period. Infants with a larger number of normal nephrons have mild renal impairment and present at age 3 to 5 years with progressive liver failure and portal hypertension. **US is used to make the diagnosis in most cases. Both kidneys are large and echogenic centrally, with a sonolucent rim of compressed cortex. Visualized cysts are generally small (<5 mm).** Children with less severe renal disease develop larger cysts. US shows an enlarged, echogenic liver with splenomegaly, dilated portal vein, and enlarged portosystemic collateral vessels in the older children who develop liver disease.
- Hyperechoic enlarged kidneys
 - *dahnert*

2006

- A 5 year old male with ectopic insertion of the ureter is most likely to have which of the following?
 - a. Duplication of the collecting system
 - b. Dribbling and urinary incontinence
 - c. Recurrent urinary tract infections
 - d. Reflux of the ectopic ureter

2006

- A 5 year old male with ectopic insertion of the ureter is most likely to have which of the following?
 - a. Duplication of the collecting system (single system more common in males)
 - b. Dribbling and urinary incontinence (almost exclusively females)
 - c. **Recurrent urinary tract infections** (common in males)
 - d. Reflux of the ectopic ureter (reflux is into normal ureter-Lower pole)

Recurrent urinary tract infections (epididymitis)

- females, more than 80% of ectopic ureters drain duplicated systems. In males, most ectopic ureters drain a single system
- Ectopic ureters occur more frequently in females than in males (by a ratio of 6:1).
- Consider ectopic ureteral insertion in prepubertal boys who have a history of recurrent epididymitis. Postpubertal males with ectopic ureters most commonly present with complaints of chronic prostatitis and painful intercourse and ejaculation.
- Approximately 50% of females with ectopic ureters present with constant urinary incontinence or vaginal discharge
 - *Emedicine; Megaureter and other Congenital Ureteral Anomalies*

2006

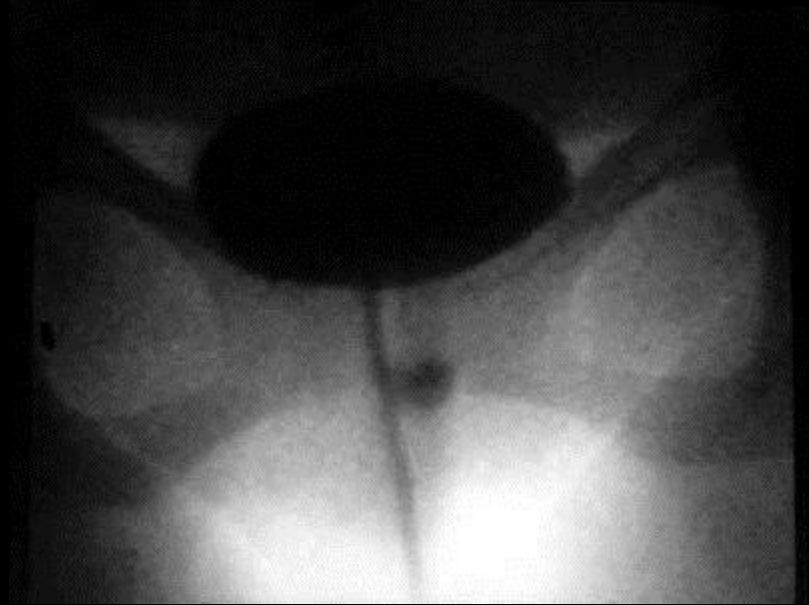
- Concerning urethral diverticula all of the following are true except?
 - A. They are more common in males
 - B. They are associated with urinary incontinence
 - C. They may cause an impression on the posterior aspect of the urethra
 - D. They occur commonly at the penoscrotal junction in males
- THIS QUESTION NEEDS A LOT OF WORK. I DON'T REMEMBER THE SET UP WELL.

2006

- Concerning urethral diverticula all of the following are true except?
 - A. They are more common in males (almost exclusively females)
 - B. They are associated with urinary incontinence (recurrent UTI's)
 - C. They may cause an impression on the posterior aspect of the urethra
 - D. They occur commonly at the penoscrotal junction in males (although rare in males)
- THIS QUESTION NEEDS A LOT OF WORK. I DON'T REMEMBER THE SET UP WELL.

They are more common in males

- Female urethral diverticulum is a localized outpouching of the urethra into the anterior vaginal wall. Most often present in the mid or distal urethra, it results from enlargement of obstructed periurethral glands.
- Presenting symptoms are classically described as the triad of postvoid dribbling, dysuria, and dyspareunia
 - *emedicine*
- The common form of urethral diverticulum is congenital and seen in males at the penoscrotal junction
 - *Indian Journal of Radiology and Imaging*



They are more common in males

- Urethral diverticula are rare in males, and arise as out-pouchings from the urethral lumen and communicate with it via a narrow ostium. Most urethral diverticula (90%) are acquired while less than 10% are truly congenital in origin. Most congenital diverticula (formed due to faulty closure of urethral folds and persistent embryonic epithelial rests with absence of the urethral wall) are found in the anterior urethra while acquired diverticula (usually due to distal urethral obstruction, suppuration, necrosis of the urethral wall following trauma, instrumentation, false passage, or drainage of a prostatic abscess) are found in the posterior urethra. **Peno-scrotal location is the commonest site for anterior urethral diverticula.** Known causes of acquired diverticula in men include urethral strictures, hypospadias and post ventral scrotal onlay island flap urethroplasty. Differential diagnosis includes syringoceles (cystic dilatation of the Cowper's gland), sequestration cysts, epidermoid and epithelial inclusion cysts. True anterior urethral diverticula always have an epithelial lining, which can be distinguished from acquired diverticula on histopathology.

Anterior Urethral Diverticulum

- Congenital urethral diverticulum- occurs only in males and arises from the ventral surface of the anterior urethra
- Urethral diverticulum in the adult female is thought to be acquired
- In the male- anterior urethral diverticulum is the result of failure of closure of urethral folds or an abortive attempt at urethral duplication
- Diverticulum has a narrow neck and fills during voiding, as it fills it increases in size and compressed the true urethra
- May result in significant obstructive voiding symptoms
- At the end of micturition, the diverticulum empties, causing postvoid dribbling
- Dx is best accomplished by voiding cystourethrography
- Removal requires urethroplasty to repair the defect in the urethral floor
- Anterior urethral valves have also been described and are difficult to distinguish from an anterior urethral diverticulum
- Dorsal Urethral Diverticulum can occur in the region of the fossa navicularis
 - These are typically round and are known as lacuna magna
 - Opening is obscured during retrograde urethrography but, if suspected can usually be demonstrated by voiding studies

2006

- Concerning the evaluation of a male for urethral strictures with a retrograde urethrogram, which of the following are true?
 - A. Spot images should be performed in an oblique projection
 - B. Overhead images should be performed with the urethra maximally distended
 - C. Must use non-ionic contrast material
 - D. Catheter should be placed under fluoroscopy
 - E. Contrast should be dripped in by gravity

2006

- Concerning the evaluation of a male for urethral strictures with a retrograde urethrogram, which of the following are true?
 - A. Spot images should be performed in an oblique projection (T-Exam is performed with pt in RPO position)
 - B. Overhead images should be performed with the urethra maximally distended (F)
 - C. Must use non-ionic contrast material (F)
 - D. Catheter should be placed under fluoroscopy (F)
 - E. Contrast should be dripped in by gravity (F)

Spot images should be performed in an oblique projection

- The patient is placed in a supine 45° oblique position. The penis should be placed laterally over the proximal thigh with moderate traction.
- If the patient is not positioned sufficiently oblique, the bulbous urethra will appear foreshortened and will therefore not be adequately evaluated
- *Imaging of Urethral Disease: A Pictorial Review1 ; Radiographics*

2006

- 65 year old has a painless, palpable left scrotal mass. Ultrasound demonstrates a hypoechoic lesion involving the testicle and epididymus. What is the most likely etiology?
 - A. Seminoma
 - B. Epididymoorchitis
 - C. Lymphoma
 - D. Adenomatoid tumor

2006

- 65 year old has a painless, palpable left scrotal mass. Ultrasound demonstrates a hypoechoic lesion involving the testicle and epididymus. What is the most likely etiology?
 - A. Seminoma (homogeneous, hypoechoic, intratesticular, most commonly 25-35 y/o, painless)
 - B. Epididymoorchitis (enlarged testes/epididymous, edematous, irregular outline, testicular)
 - C. **Lymphoma** (diffuse or focal, inhomogeneous, predominantly hypoechoic, age > 50y/o) Lymphoma is the most common secondary testicular cancer. Among men older than 50, testicular lymphoma is more common than primary testicular tumors.
 - D. Adenomatoid tumor (hyperechoic, extratesticular)

Lymphoma

- (diffuse or focal, inhomogeneous, predominantly hypoechoic, age > 50y/o)
- Lymphoma is the most common secondary testicular cancer.
- Among men older than 50, testicular lymphoma is more common than primary testicular tumors.

2006

- Which of the following tumors is **least** likely to have bony metastases?
 - A. Neuroblastoma
 - B. Wilms tumor
 - C. Rhabdomyosarcoma
 - D. Clear cell carcinoma
 - E. Renal cell carcinoma

Wilms tumor

- **Bone metastases are extremely rare in patients with classical Wilms' tumor.**
- **Pediatr Radiol. 1994;24(2):85-7**
- **Bone mets are much more common in the others**

2006

- Concerning urethral strictures, which of the following is true?
 - A. Strictures associated with catheterization typically at the penoscrotal junction
 - B. Gonococcal strictures tend to involve short segments of the urethra

Strictures associated with catheterization typically occur at the penoscrotal junction

- In general, urethral strictures are divided into two main categories:
 - Anterior urethra (from the sphincter [control muscle] to the tip of the penis) includes **penoscrotal junction**.
 - Posterior urethra (from the bladder to the urethral sphincter)
- Strictures that occur in the anterior urethra are usually a result of an injury to the urethra, and its development may not become evident for many months to years. The **most common location for a stricture in the anterior urethra** is in what's known as the bulbar urethra, which is that part of the urethra that sits just below the pubic bone. "Straddle" injuries, such as falling onto the crossbar of a bicycle, may cause a urethral contusion ("bruising") to occur, and a stricture develops as these injuries heal. Other **causes include injury from placement of a catheter**, trauma from endoscopes or foreign bodies, and sexually transmitted diseases (STDs). STDs cause intense inflammation of the urethra and the surrounding tissues, causing urethritis. Left untreated, this inflammation may result in scarring or stricture formation. Prompt diagnosis and treatment of urethritis reduces the risk of subsequent stricture formation

2006

- US of testicle showing a partial cystic lesion involving both the testicle and epididymis, the most likely entity? Patient is asymptomatic (no fever, pain)
 - A. Lymphoma
 - B. Seminoma
 - C. Epididymoorchitis
 - D. Adenomatoid tumor

Adenomatoid tumor

- An adenomatoid tumor is the most common extratesticular neoplasm.
- This benign tumor can arise from the epididymis or the testicular tunica.
- When the mass arises from the tunica vaginalis or tunica albuginea, sonographic findings may distinguish it from a peripheral testicular tumor

2006

- Most common cause of nephrocalcinosis in a 35 year old female?
 - Hyperthyroidism
 - Hyperparathyroidism
 - Bobby Boucher (Adam Sandler – “The WaterBoy”)
- Other recalls specified cortical nephrocalcinosis and gave the choice of chronic glomerulonephritis

Hyperparathyroidism

- Primary hyperparathyroidism is the single most common cause of nephrocalcinosis in adults.
Nephrocalcinosis is related more to the duration than the intensity of hypercalcemia.
Nephrocalcinosis occurs in 5% of the cases of hyperparathyroidism. The classical clinical findings are "stone," "bones," and "abdominal groans." This common phrase is a reminder that patients may present with abdominal discomfort, bone pain, pathological fractures, osteoporosis, or osteopenia. A presentation of hyperparathyroidism, albeit rare, can be associated with multiple endocrine neoplasia (MENI).
 - *emedicine*

2005

2005

Female with bladder base elevation and post void dribbling most likely has

- A) Urethral diverticulum
- B) Urachal cyst
- C) Bladder diverticulum
- D) Ectopic ureterocele
- E) Mullerian duct remnant

2005

Female with bladder base elevation and post void dribbling most likely has

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- E) Mullerian duct remnant

Urethral diverticulum

- Repeat from 2003 exam.
- Urethral diverticulum may be either congenital or acquired. Congenital saccular diverticulum occurs in boys at the midpenile urethra (2nd most common cause of urethral obstruction in males after posterior urethral valves).
- Acquired urethral diverticulum (aka pseudodiverticulum) occurs in adults and can be caused by infection/abscess, pressure necrosis from prolonged catheterization, or from high pressure secondary to urethral stricture. On IVU, a large diverticulum may elevate the base of the bladder (“the female prostate sign”). It can cause obstruction of the urinary stream (hence, dribbling). (GU Requisites, p.245 ; Kirks, p.1060).
- A urethral diverticulum can be described as an outpouching of tissue from the urethra into the urethrovaginal potential space. The lining of the diverticulum most commonly is identical to the urethral mucosa. Most urethral diverticula are believed to be derived from dilated paraurethral ducts or glands.
- Classic findings include a palpable anterior vaginal wall mass and expression of purulent material from the urethra upon compression.
- Include urethral diverticulum in the differential diagnosis in patients reporting recurrent UTIs, stress incontinence or postvoid dribbling, urinary urgency and frequency, dysuria, urethral pain, urinary retention, dyspareunia, hematuria, or purulent urethral discharge

Female Urethral Diverticulum

- Acquired
- Si/Sx
 - Chronic irritative voiding symptoms
 - Postvoid dribbling
 - Dyspareunia
- Most lie posterior to the urethra but they also can be located laterally or anteriorly, or even surround the urethra (“saddle” diverticulum)
- When a diverticulum originates from the proximal urethra, there may be mass effect on the bladder base similar to that seen in elderly men with enlarged prostates. This is termed the “female prostate”
- Can see on excretory urography or voiding cystourethrography
- If suspicion remains after above studies a double balloon retrograde urethrogram may be diagnostic
- A filling defect in a diverticulum is a rare finding but, when present may be caused by a stone, debris or tumor.
- Although squamous cell ca is the most common neoplasm in the female urethra, adenocarcinoma is the most frequently diagnosed tumor in a diverticulum

2005

The most likely karyotype in partial molar pregnancy is:

- A. diploid
- B. aneuploid
- C. triploid
- D. 45X
- E. trisomy 21

Triploid

- There are two types of molar pregnancy –
 - partial and
 - complete.
- A partial, incomplete, molar pregnancy is usually triploid, containing 69 chromosomes of both maternal and paternal origin. The most common mechanism for the origin of **partial** mole is a haploid egg being fertilized by two sperm, resulting in three sets of chromosomes. Alternatively, triploidy could result when an abnormal diploid sperm fertilizes the haploid egg. Some **partial** moles have occurred with phenotypically normal fetuses. In such cases the uterus is small for dates.
- In complete mole, only paternal chromosomes are believed to be present; there are 46 chromosomes and nearly always 46, XX, Complete moles have a higher incidence of malignant degeneration than partial moles. This is very rare in partial moles.
- With moles, the normal placenta is replaced by hydropic villi, which are seen at US as multiple tiny cystic spaces, giving a "snowstorm" appearance

- Ref: Radiographics - Detection of Fetal Structural Abnormalities with US during Early Pregnancy, Katherine W. Fong, Ants Toi, Shia Salem, Lisa K. Hornberger, David Chitayat, Sarah J. Keating, Fionnuala McAuliffe, and Jo-Ann Johnson
- MD consult – Comprehensive Gynecology, p.1049

2005

The diagnosis of Asherman's syndrome (uterine synechiae) is best made by which modality?

- A. US Pelvis
- B. US Abdomen
- C. MRI pelvis
- D. CT
- E. HSG

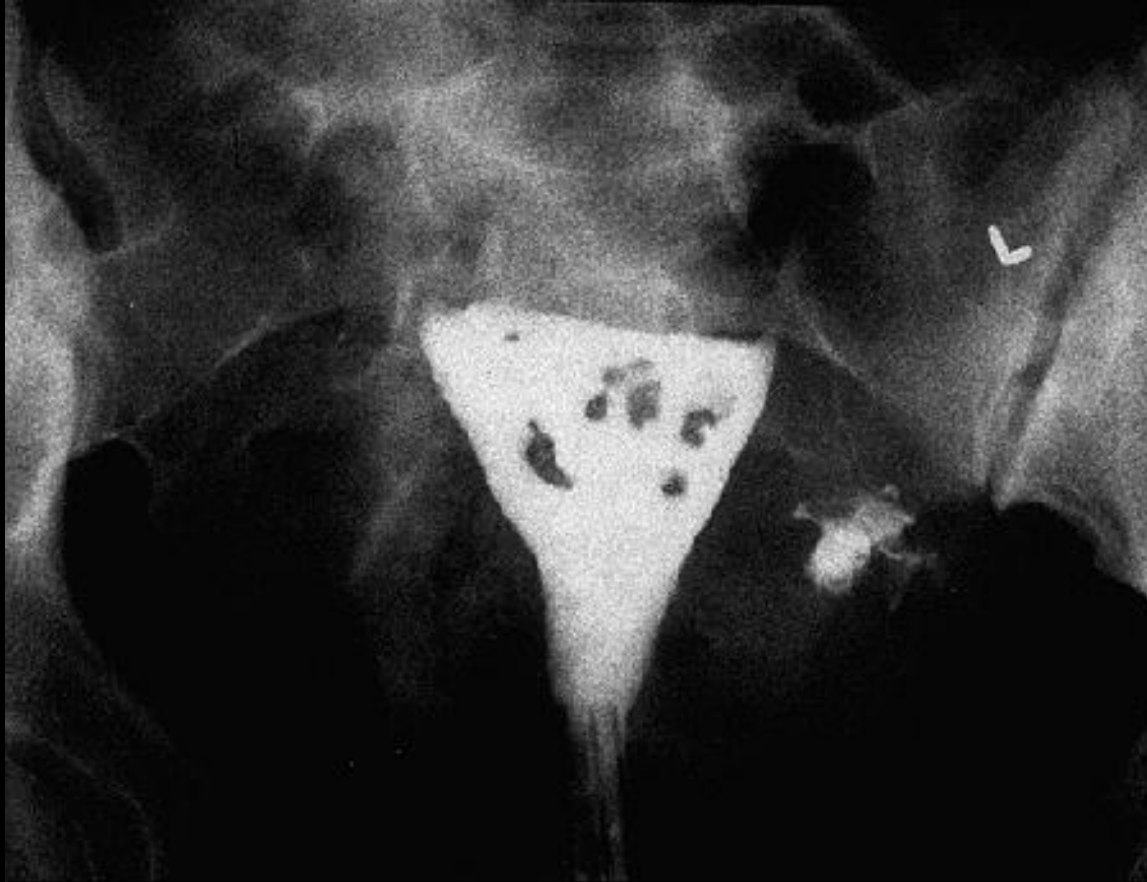
HSG

- Asherman's syndrome refers to persistent amenorrhea and secondary infertility, which is caused by intrauterine adhesions or synchechiaae.
- Most often a sequela of therapeutic curettage or severe endometritis.
- Most commonly evaluated with HSG or hysteroscopy
- linear, lucent defects in uterus on HSG
 - *CHORUS notecard*

Asherman's Syndrome

- Eponym associated with intrauterine scars or seneciae
- Most often preceded by injury to the endometrium, which in turn is most often caused by curettage
- May form after other uterine surgery that involves the endometrial cavity, injury from intrauterine contraceptive devices, or pregnancy-associated uterine injury
- Severe endometritis may produce seneciae; infx, complicating any of the traumatic events mentioned above, makes scars more likely to form
- Often diagnosed by hysteroigraphy or hysteroscopy
- Hysteroigraphy
 - Appearance of uter is variable but always manifests some degree of adhesion of part of the endometrial surface to another
 - Adhesions may be in the fundus, body or cervix
 - Adhesions may be single or multiple
 - Scars produce persistent lucencies
 - May be linear or geographic
 - May obliterate entire endometrial cavity
- US
 - May demonstrate scarring if it is severe
 - It has been reported to produce echogenic distortion of the endometrial stripe

Asherman's Syndrome



2005

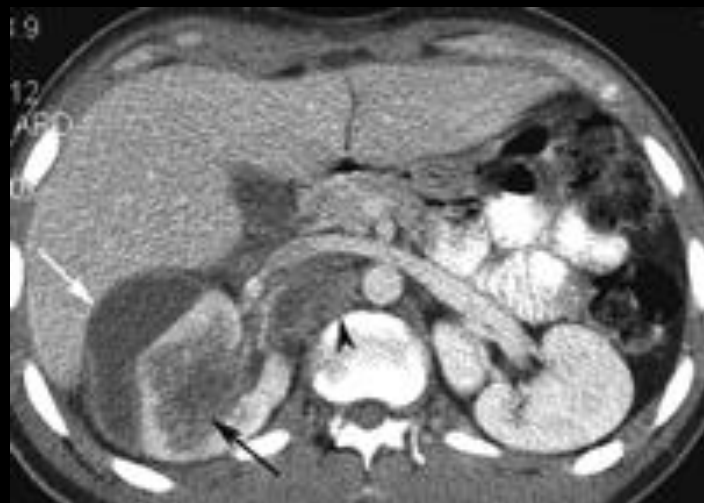
- What is most common renal tumor in patient with SC trait.
 - A. RCC
 - B. Renal Medullary Carcinoma
 - C. TCC

2005

- What is most common renal tumor in patient with SC trait.
 - A. RCC
 - B. Renal Medullary Carcinoma
 - C. TCC

Medullary Carcinoma *[Figure 3-1-9]*

- Young Black male with sickle cell trait
- From epithelium of papilla or distal collecting duct
- Survival < 4 mos.



2005

60 year old male with hematuria and non contrast CT shows filling defect 75 HU.

- A. Hematoma
- B. Fungus Ball
- C. UrateStone
- D. TTC
- E. Ectopic papilla

Hematoma

- the other answers would have a soft tissue Hounsfield units 30-50 with the exception of Urate stone which would be higher than 75 HU, D/w Dr. Oliphant.

2005

Best way to differentiate HIV nephropathy.

- a. renal size.

HIV Nephropathy

- proteinuria, azotemia, **normal-to-large kidneys on ultrasonography images**, normal blood pressure, and focal segmental glomerulosclerosis on renal biopsy findings.
- Enlarged kidneys--may result from prominent interstitial expansion by cellular infiltrate and markedly dilated tubules containing voluminous casts.
- Also see b/l large kidneys—in diabetic nephropathy, leukemia, lymphoma, acute glomerulonephritis, vasculitis,
- Collagen Vascular disease.
- Requisites—GU pg 143-144

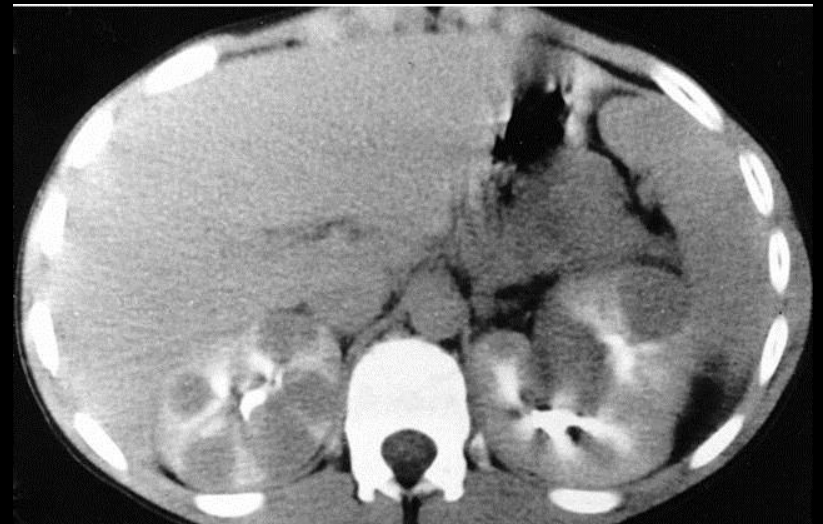
2005

- Regarding renal lymphoma, which is true
 - A. most likely hyperechoic
 - B. posterior acoustic enhancement
 - C. most likely hodgkins
 - D. usually multifocal

Renal Lymphoma

- usually Nonhodgkins is most common.
- Renal lymphoma is due to hematogenous or direct spread.
- Typical appearance is multiple bilateral hypoechoic masses.

- Ref: Requisites



2005

- Calcification is seen within the bladder in all of the following except:
 - a. Malacoplakia
 - b. Tuberculosis
 - c. Transitional cell carcinoma
 - d. Alkaline encrustation

2005

- Calcification is seen within the bladder in all of the following except:
 - a. Malacoplakia
 - b. Tuberculosis
 - c. Transitional cell carcinoma
 - d. Alkaline encrustation

Malacoplakia

- a granulomatous inflammatory process that affects the urinary bladder and lower ureter in immunocompromised pts—associated w/ *E. coli* infections. Soft, yellow plaques seen on surface of bladder., due to deficient lysosomes in macrophages.
 - Mural or luminal calcifications --- bladder stone, TCC (0.5 %) , cystitis (TB, schistosomiasis, radiation, cyclophosphamide) , amyloidosis,,
 - Foreign body associated encrustation.
-
- GU requistes and AFIP notes

2005

Not associated with kidney cysts

a) TS

b) NF

c) VHL

2005

Not associated with kidney cysts

a) TS

b) **NF**

c) VHL

B. Neurofibromatosis

- There is a huge list of syndromes associated with multiple renal cysts (page 112 GU Requisites). There are several of these syndrome that contain cystic lesion in other organs (liver, kidney, pancreas).
- **VHL:** 75% of patients have simple renal cysts. 40% of patients develop RCC. Also associated with hemangioblastoma of the cerebellum, retinal angiomas, pancreatic cysts. Pancreatic cystic neoplasms occurs in 50% of patients with VHL.
- REMEMBER: pancreatic cysts are uncommon in other diseases. They can be seen in patients with ADPKD but you also usually see liver and kidney cysts. **Pancreatic cysts without coexisting liver cysts in patients with renal cysts strongly suggest the diagnosis of VHL rather than ADPKD.**
- **VHL:** also develop pheochromocytoma (15%) - of which 50-80% will have multiple bilateral extraadrenal pheo, hepatic adenomas, pancreatic adenocarcinoma, islet cell tumor, pancreatic microcystic adenoma, papillary cystadenoma of the epididymis.
- **Tuberous Sclerosis:** Renal abnormalities == 80% develop renal AML - usually multiple and bilateral, can coexist with cystic disease. A small subset of patient with TS usually those diagnosed in childhood develop renal cysts without AML which can mimic ADPKD radiographically.

2005

- Male with long standing HTN and MRI demonstrating unilateral adrenal mass with loss of signal between IP & OOP imaging.
 - A. Adenoma with Conn's syndrome
 - B. Adenoma with essential HTN
 - C. Adenoma with cushings
 - D. Pheo

Adenoma with essential HTN

- Adenoma is classified into two types based on function
 - 1. Nonhyperfunctioning: Normal hormone levels
 - 2. Hyperfunctioning: Primary hyperaldosteronism; Cushing syndrome; hyperandrogenism.
- 2003 recall answer
- Primary hyperaldosteronism (Conn's Syndrome):
 - 75% due to adenoma,
 - 25% hyperplasia (kids: hyperplasia > adenoma);
 - carcinoma is a rare cause
 - clinically: HTN, hypokalemia
 - moderate HTN; +/- mild frontal HA; fatigue, weakness; is cause of <1% of HTN cases
 - lab: +/- hypernatremia—one book said yes, the other no; hypokalemia; alkalosis; increased K⁺ excretion; low plasma renin; **increased (nonsuppressible) aldosterone** levels
 - M>F; 30-50 years old
- Aldosterone
 - acts on the cortical collecting tubule to stimulate the Na⁺/K⁺ ATPase pump which increases K⁺ excretion and increases sodium resorption, accounting for the above findings.
- Renin
 - is released by the juxtaglomerular cells in response to low blood pressure
 - It increases aldosterone production.
 - Therefore it will be low in this condition because aldosterone and BP are both already high.
 - also converts angiotensinogen to angiotensin I, which is converted in the lung to angiotensin II, a potent vasoconstrictor that increases BP.

2005

- MCDK associated most with what contralateral abnormality
- a) contralateral UPJ obstruction

a) contralateral UPJ obstruction

- A **multicystic dysplastic kidney** has multiple macroscopic cysts throughout or replacing the renal parenchyma. It is most often unilateral, but contralateral ureteropelvic junction obstruction is frequently present. On ultrasonography, multiple cysts of various sizes are seen in the expected location of the kidney (TF). Results from occlusion (severe UPJ) of the ureter in the fetus before 10 weeks gestation. Absent or atretic renal vessels and collecting systems. Hypertrophy of the contralateral kidney (P776). MCDK is the second most common cause of an abdominal mass in the neonate after hydronephrosis. **MCDK is the most common form of cystic disease in infants.** (D578)

MCDK

- Typically Findings
 - Irregular cysts and fibrous tissue
 - Absent renal collecting system
 - Atretic ureter
 - Absent renal artery
- Second most common cause of abdominal mass in a neonate (behind hydronephrosis)
- Males > Females
- Predilection for the Left Kidney
- Common Associations
 - Bilateral MCKD
 - Ureteropelvis junction obstruction (most common)
 - Hypoplasia of the opposite kidney
 - Horseshoe kidney
- Segmental multicystic renal dysplasia in an upper pole moiety may be seen in pts with obstruction from an ectopic ureterocele. It causes compression of the normally functioning lower pole moiety
- A hydronephrotic type exists
 - Probably results from incomplete obstruction of the ureter after the tenth week of gestation
 - Renal pelvis communicates with multiple cysts
 - Fx may be present
 - Surgery is indicated in pts with the hydronephrotic type of disease because, significant renal fx often can be preserved

UPJ Obstruction

- Congenital
 - Common anomaly
 - Produces caliectasis and marked pelviectasis as a result of a functional narrowing of the UPJ
 - Mc cause of an abdominal mass in a neonate
 - Presentation- varies, may not be discovered until adulthood
 - Males>females, 2:1
 - Left>Right
 - Familial tendency
- “Beer Drinker’s Hydronephrosis”
 - Sustained diuresis
 - Mild cause of UPJ Obstruction
 - Under normal urine volumes the UPJ is compensated
 - Urograms made while such a pt is asymptomatic may show only an extrarenal pelvis; the use of a diuretic renogram or a urographic study during acute symptoms has been advocated to demonstrate the underlying abnormality
- 5% of cases may be due to an aberrant renal artery that results in extrinsic compression
- Secondary
 - Dt an acquired disorder of the renal pelvis or vesicoureteral reflux

UPJ Obstruction

- Urography
 - Dilated renal pelvis and calyces
 - Slow opacification of the affected side
 - Delayed radiographs needed to ascertain that the UPJ is the area of obstruction
 - If long standing or very high grade obstruction a virtually nonfunctioning kidney may be present
 - UPJ may be difficult to visualize
- True UPJ vs Extrarenal Pelvis
 - Extrarenal pelvis- renal pelvis may appear quite dilated however there is absent caliectasis
- Variable filling of the ureter may occur distal to the UPH
- When there is significant kinking of the UPH the possibility that the obstruction is secondary to an aberrant vessel should be considered
- Some advocate voiding cystourethrography in all pts with suspected UPH obstruction to exclude vesicoureteral reflux as a cause of the renal pelvic dilation, especially if there is any dilation of the ureter below the UPJ
- TX
 - Pyeloplasty
 - Balloon pyeloplasty
 - Endoscopic endopyelotomy

2005

- Most common malignancy to involve the testicle (or most common to metastasize to testes)
 - A. Lymphoma
 - B. Prostate
 - C. Colon
 - D. Lung
 - E. Breast

Lymphoma

- Metastases: lymphoma-most common in older men,(bilateral), leukemia, prostate and lung(GU Requisites)
- Lymphoma, leukemia, and melanoma are the most common malignancies that metastasize to the testicle.
 - *Emedicine; testicle malignancy*

2005

What is cause of hyperechogenicity in renal cortices of neonate?

- A. Lasix tx
- B. ATN
- C. Hypercalciuria
- D. RV thrombosis

2005

What is cause of hyperechogenicity in renal cortices of neonate?

- A. Lasix- medullarynephrocalcinosis
- B. ATN
- C. Hypercalciuria- medullarynephrocalcinosis
- D. RV thrombosis

ATN

- Increased renal cortical echogenicity can be seen with
 - glomerulonephritis,
 - **ATN**,
 - nephritic syndrome,
 - amyloid,
 - nephrosclerosis,
 - Leukemia,
 - Goodpastures,
 - HSP
- Ref. Rumack

2005

The juxtaglomerular apparatus responds to

- a) fluid overload
- b) high K^+ at the macula densa
- c) decreased renal artery pressure

2005

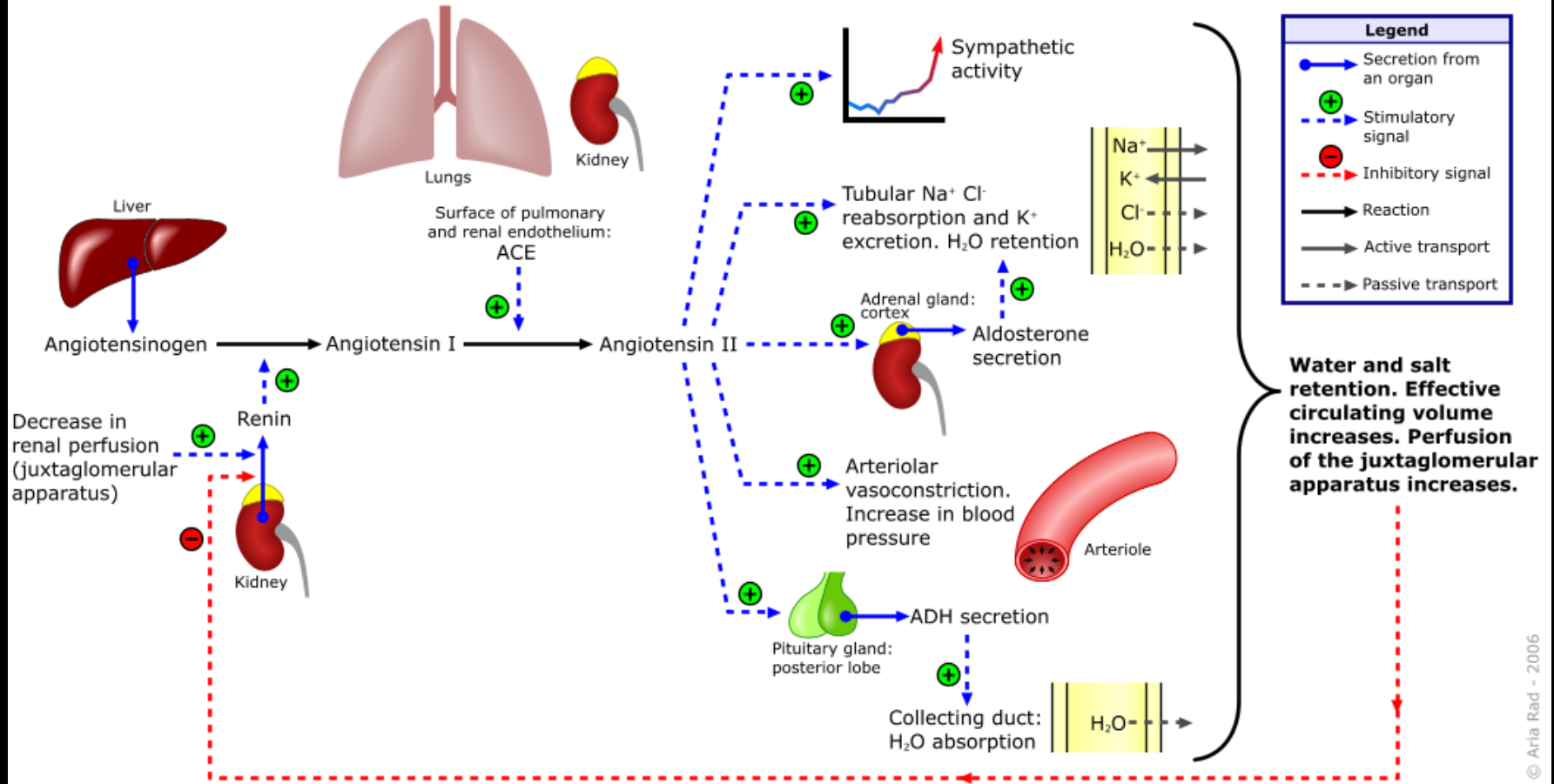
The juxtaglomerular apparatus responds to

- a) fluid overload
- b) high K^+ at the macula densa
- c) **decreased renal artery pressure**

Juxtaglomerular Apparatus

- The **juxtaglomerular apparatus** is a [renal](#) structure consisting of the [macula densa](#) and [juxtaglomerular cells](#).
- Aka granular cells
- site of [renin](#) secretion.
- The JG cells found in the afferent arterioles of the [glomerulus](#) act as an intra-renal pressure sensor.
- Lowered pressure leads to secretion of [renin](#) which acts to increase systemic blood pressure via the [renin-angiotensin system](#).
- The macula densa senses fluid flow rate as well as sodium chloride concentration in the distal tubule of the kidney and secretes a locally active (paracrine) vasopressor which acts on the adjacent afferent arteriole to decrease GFR.

Renin-angiotensin-aldosterone system



2005

- What is the most common cause of bilateral smooth renal enlargement of an adult
- a) HIV
- b) RVT
- c) reflux
- d) ATN

ATN

- HIV nephropathy causes bilateral renal enlargement without hydronephrosis
- ATN results in bilateral smooth large kidneys
 - *Primer*
- Differential for Bilateral smooth enlarged kidneys:
 - HIV (kidneys are also echogenic),
 - amyloid,
 - multiple myeloma,
 - early ATN,
 - lymphoma,
 - leukemia.
- Unilateral smooth enlarged kidney:
 - renal vein thrombosis,
 - acute arterial infarct,
 - obstruction,
 - acute pyelonephritis,
 - XGP,
 - compensatory hypertrophy.
- *Davidson's Radiology of the Kidney and GU tract.*

2005

ARPKD, which is true

- a) periportal hepatic fibrosis is expected
- b) should screen parents for the disease

A. periportal hepatic fibrosis is expected

- *Path:* kidney: abnormal proliferation + dilatation of collecting tubules resulting in multiple 1- to 2-mm cysts
- liver: periportal fibrosis often with abnormal proliferation + dilatation of bile ducts
- pancreas: pancreatic fibrosis

2005

Malignancy of the ureter most associated with

- a) uretercystica
- b) malacoplakia
- c) bladder cancer

Bladder cancer

- Bladder cancer can have associated ureteral cancer 2-9% of the time.
- Ureteritis cystica and malacoplakia are benign entities.
- Malacoplakia: rare inflammatory condition which commonly affects the bladder. Plaques of mononuclear histiocytes. On IVP, multiple mural filling defects with flat or convex border are seen, giving a cobblestone appearance.
- Pyeloureteritis Cystica: asymptomatic ureteral and/or pyelocalyceal cysts 2-4mm (up to 2cm) related to infection or calculi. Small multiple intraluminal filling defects (cysts originate from degenerated uroepithelial cells)

Pyeloureteritis Cystica

- Findings include multiple round radiolucent defects, scalloped ureteral appearance when seen en face (profile) and defects are fixed and stationary within the viscus.
- **Diagnosis:** Pyeloureteritis Cystica
- Uhrad.com



2005

What will NOT cause an 11mm endometrium in a post-menopausal patient

- a) endometrial atrophy
- b) endometrial hyperplasia
- c) endometrial cancer
- d) endometrial polyps

Answer: A. endometrial atrophy

- Causes of a thickened endometrial stripe:
 - endometrial CA: post menopausal bleeding is the most common presentation. Usually in a women >50. (Normal thickness of endometrial stripe is <8 mm in a NON-bleeding postmenopausal female and <5 mm in a bleeding post menopausal female).
 - Endometrial hyperplasia—caused by unopposed estrogen stimulation (Tamoxifen, obesity, hormone replacement, PCO, anovulatory state)..Obesity is most common cause of unopposed estrogen stim,
 - Endometrial polyps- on sonohistogram: diffuse endometrial thickening is hyperplasia or CA and focal endometrial thickening with a feeding artery is a polyp.
 - Endometritis—complication of post partum, instrumentation, PID. Endometrium is irregular and thickened. Gas echoes in the endometrial canal are most specific,
- In a postmenopausal bleeding female, if endometrial stripe on US is less than or equal to 4 mm, the cause is atrophy.
 - *(Noon conference with Dr. Jorizzo on 4/8/05 and AFIP: Imaging of Uterine Disorders/Dr. Woodward)*

2005

What will not cause diffuse endometrial canal thickening

- a) adenomyosis
- b) endometrial hyperplasia
- c) endometrial cancer
- d) endometrial polyps
- e) tamoxifen

Answer: A. adenomyosis.

- Adenomyosis= heterotopic implants of endometrium within the myometrium.
- Adenomyosis: US- enlarged, echogenic, heterogeneous uterus
- MRI
 - T2W MR imaging is study of choice
 - Focal or diffuse thickening of the junctional zone (>12mm) is the key finding
 - High SI endometrial foci within myometrium
 - Enlargement of Uterus

2005

- Where is the most common location for extra-adrenal pheo (paraganglioma)
 - A. lumbar sympathetic chain
 - B. sacral sympathetic chain

Answer: lumbar sympathetic chain

- The organ of Zuckerkandle is the most common site of occurrence of an extra-adrenal paraganglioma. It is located near the origin of the IMA and the abdominal aortic bifurcation and functions in homeostatic maintenance of blood pressure in early fetal life, i.e. it is sympathetic fibers along the anterior abdominal aorta. Occurs in 30-45 yo usually. Female>male. It is more malignant than other paragangliomas and usually secrete excess catecholamines. They are positive on MIBG nucs study.
- Additional common locations of extra-adrenal paragangliomas: carotid body tumor, jugular bulb (glomus jugulare), middle ear (glomus tympanicum), nodose ganglion of the vagus nerve (glomus vagale). These usually have a female predominance except for the carotid body tumor. On MRI paragangliomas are: “salt and pepper” in appearance related to the flow voids associated with the neovascularity of the tumor. Iso on T1 and hyperintense on T2 with avid early enhancement. Can be associated with bone destruction.
- Pheo's: Rule of 10's= 10% bilateral, 10% extra-adrenal, 10% malignant, and 10% familial
- Pheo's assoc with MEN II, VHL, NF-1
- Pheo's are very bright on T2 MRI and are usually positive on MIBG
- (Brigham Radiology case Presentation, June 23, 2003 and Brandt and Helms pg. 775 and AFIP: Retroperitoneum/Dr. Woodward)

2005

Which is true of uterus

- a) adenomyosis can be differentiated from fibroid by U/S
- b) adenomyosis is dark on T2 with foci of increased signal

b) adenomyosis is dark on T2 with foci of increased signal

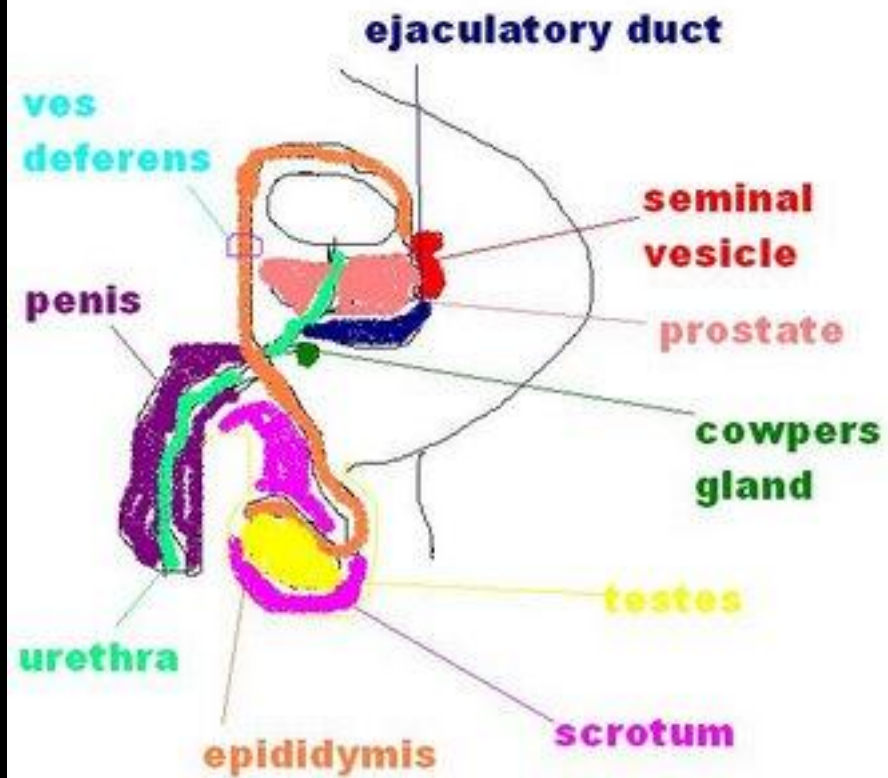
- Adenomyosis: may be diffuse or focal.
- The focal form can be confused for a fibroid on US.
- It is easier to differentiate focal adenomyosis from fibroid on MRI.
- On MRI adenomyosis has a low signal myometrium on T1 and T2 with punctate foci of high signal which are the ectopic endometrial glands.

2005

- Cowper's ducts at level of
- a) posterior to bulbous urethra
- b) anterior to bulbous urethra
- c) posterior to prostatic urethra
- d) posterior to fossanavicularis

Posterior to bulbous urethra

- Cowper's glands/ducts: narrow channels (paired) at the posterior bulbous urethra (per Dr. Dyer)
- Bulbourethral glands (Cowper's) are located posterior and lateral to the membranous portion of the urethra at the base of the penis



2005

Which not true of VHL

- a) AML
- b) RCC
- c) islet cell tumors
- d) cysts

Answer A. AML

- RCC develops in 40% of VHL pt's. usually bilateral and multifocal.
- Up to 75% of VHL pt's have simple renal cysts.
- Multiple panc cysts and panc cystic neoplasms occur in up to 50% VHL pt's.
- Also assoc w/ hemangioblastoma CNS, retinal angiomas, simple cysts in other abdominal viscera, pheochromocytomas, hepatic adenomas, pancadenoma, islet cell tumors, pancmicrocystic adenomas, and papillary cystadenomas of the epididymus.
- ESRD < 5%.
- (GU REQ 111-122, AFIP)

2005

Location of mets from right testicular neoplasm

- A. infrarenal/paracaval
- B. inguinal
- C. Supraclavicular
- D. paraaortic

Answer A. R infrarenal/paracaval

- A right testicular neoplasm first metastasizes to the paracaval lymph node group at the level of or slightly inferior to the renal vn. Followed by paralumbar nodes inferior to the renal hilum or thoracic sites. Drainage from right testicle can cross over to the left retroperitoneum, but the opposite is less common. Tumors may spread to the lungs, mediastinum, or supraclavicular nodes via thoracic duct then left brachiocephalic vn. ChorioCA is prone to hematogenous mets. (GU REQ 326)

2005

- What is most ominous in evaluation of renal cysts for malignancy?
 - A. Enhancement post contrast
 - B. Fluid fluid level
 - C. Hyperdense on noncontrast study
 - D. Thin septations
 - E. Calcification

A. Enhancement post contrast

- “The combination of mural irregularity and intense mural enhancement is a strong predictor of malignancy in renal cystic lesions. However, the appearance of benign and malignant lesions may overlap, suggesting that distinct separation of these entities is not currently possible in all cases with MR imaging.” (from the article below)
- *Complex renal cysts: findings on MR imaging. AJR Am J Roentgenol. 1999 Jun;172(6):1495-500.*

2005

- What is false about adenomyosis?
 - A. Can present with areas of low T2W signal and focal areas of increased T2W signal
 - B. Usually focal
 - C. Can be confused with leiomyoma on US
 - D. Can be present in adnexa

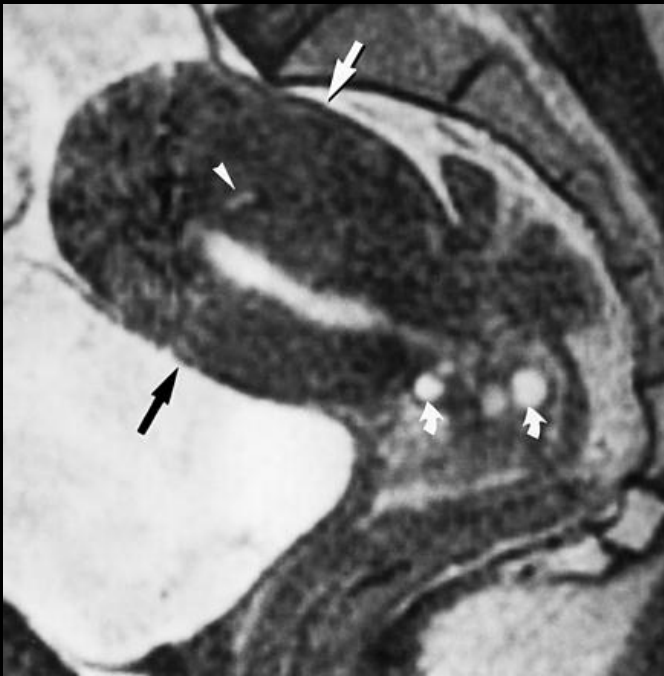
Usually focal

- Diffuse adenomyosis was seen in 30 cases (66.7%) and focal adenomyosis in 15 cases (33.3%).

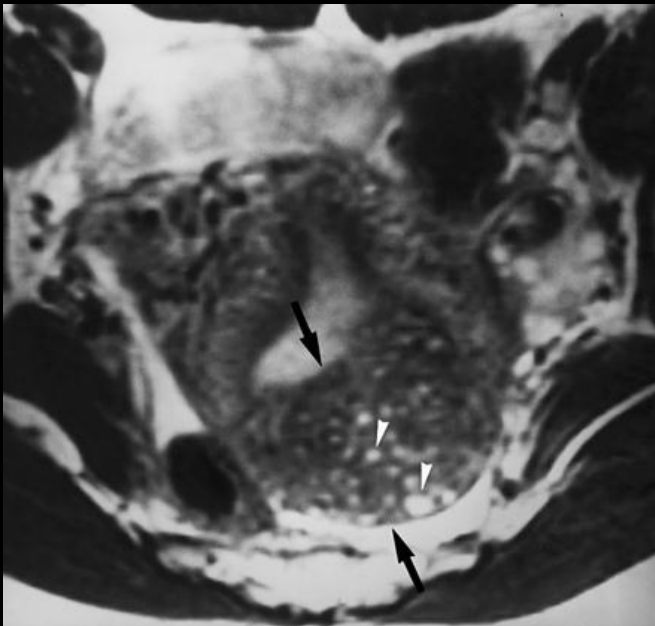
Radiographics

– *Diffuse and **Focal**Adenomyosis: MR Imaging Findings*

- Brant & Helms. Page 820-821. “Adenomyosis is best demonstrated on T2WI as focal or diffuse thickening of the junctional zone of the myometrium (>8mm) with scattered foci of high signal in involved areas. Poor definition and ill-defined margination differentiate adenomyosis from leiomyomas which are characteristically sharply circumscribed.”



- Extensive involvement of diffuse **adenomyosis** in a 42-year-old woman. Sagittal T2-weighted MR image demonstrates diffuse areas of low signal intensity involving most of the uterus (straight arrows) and punctate high-signal-intensity foci (arrowhead). A few small nabothian cysts (curved arrows) are seen in the uterine cervix.
- Focal adenomyosis in a 31-year-old woman. Axial T2-weighted MR image demonstrates an ill-defined mass with low signal intensity within the myometrium of the uterine fundus (arrows). Multiple punctate foci of high signal intensity, which are thought to represent hemorrhagic endometrial nests, are scattered throughout the mass (arrowheads). These foci were also seen on T1-weighted images (not shown).



2005

- Postmenopausal women with cyst in adnexa.
What is true? (Repeat)
 - A. If $< 5\text{cm}$ and simple, likely benign
 - B. Benign if $< 10\text{cm}$
 - C. Hormonally responsive
 - D. Benign if has enhancing walls

A. If < 5cm and simple, likely benign

- In a young women, a 2 cm simple cyst is normal. Do nothing. If the patient is post-menopausal, further workup with ultrasound is warranted. The accepted cutoff for adnexal cysts on US is 2.5 cm. Cysts larger than 2 cm should be followed with ultrasound in 2 menstrual cycles.
- In postmenopausal women, 18% of complex cysts are malignant. Complex cyst: septated cyst/cyst >3cm/cyst with low RI
 - *Dahnert*

- **PREmenopausal**

- Unilocular, <2.5cm, +/- hemorrhage → No follow-up unless on BCP
- Unilocular, 2.5-6cm, no hemorrhage → US in 1-2 months +/- hormones
- Unilocular, 2.5-6cm, with hemorrhage → US in 1 month +/- hormones
- Unilocular, >6cm → Surgery
- *All follow-up exams done immediately post-menstrual when there are no follicular cysts

- **POSTmenopausal**

- Unilocular, nonseptated, thin walled, <3cm, RI <0.4 is suspect for malignancy; → serial follow-Up
- Septated or >3cm or low RI → Exploratory surgery, check CA-125

– Dahnert

2005

- Regarding mesoblasticnephroma, which is false?
- A is a malignant tumor
- B is most common renal mass in newborn
- C looks like Wilms tumor on US
- D Spreads by local invasion
- E Can be diagnosed in utero

A is a malignant tumor

- AFIP notes (Agrons): MN most common renal neoplasm infants < 3 mo old. May be detected by antenatal US. Infiltrative growth pattern. Varied appearance on post-natal US. Rx: nephrectomy with wide margins. Overall prognosis excellent.
- Mesoblasticnephroma (fetal renal hamartoma) is the most common renal tumor in
- infants. Mesoblasticnephroma is benign and typically occurs in the first four
- months of life. On prenatal ultrasound, an enlarged kidney may be seen in an
- infant with **polyhydramnios**. On renal ultrasound, mesoblasticnephroma
- typically appears as a hypoechoic mass without posterior enhancement, sometimes
- with cystic areas. CT demonstrates a solid mass which distorts the intrarenal
- collecting system. Mesoblasticnephroma appears **hypointense on T1-weighted MR**.
- Because **the imaging appearance may overlap that of Wilms tumor**, surgical
- resection is performed and the two tumors can be differentiated histologically.
- Although most cases are benign, rarely metastases have been reported in
- incompletely- resected tumors, with spread to the heart, lungs, brain and bone.
- In contrast, **Wilmstumor has a peak incidence at 2-3 years of age**, but is rare
- in neonates. Wilms tumor is the most common abdominal tumor and the most
- common renal malignancy in children. Wilms tumor may occur with certain
- syndromes, such as WAGR (Wilms, aniridia, GU anomalies, and mental retardation)
- and Beckwith-Weidemann syndrome (hemihypertrophy, macroglossia, abdominal wall
- defects). The majority of patients present with an abdominal mass. A solid
- mass with areas of necrosis may be identified on ultrasound. Typically CT is
- performed to evaluate for extension of tumor into the renal vein and IVC or
- heart, and to evaluate for pulmonary metastases. With multi-modality therapy,
- overall survival is 90%.

2005

- Child with diffusely increased renal pyramid echotexture. What is not a likely cause?
 - A. Lasix administration
 - B. RTA
 - C. Elevated serum calcium
 - D. Prune belly
 - E. Fanconianemia

Answer: D Prune belly

- (*Eagle-Barrett*) syndrome is a condition that is seen almost exclusively in males. Features include absent or deficient abdominal musculature; a large, vertically oriented urinary bladder; severe hydronephrosis
- and ureterectasis; cryptorchidism; and urethral dysfunction leading to functional bladder obstruction. Urachal remnants are also common.
- Causes of increased echogenic renal pyramids
- -usually a nonspecific finding of metabolic disease
- Normal neonate
- Tamm-Horsfall proteinuria
- Sickle-cell disease
- Hypercalciuria
 - Renal tubular acidosis
 - Medullary sponge kidney
 - Hyperparathyroidism
 - Drugs (furosemide, steroids, vitamin D)
 - Prolonged immobilization
 - Bartter syndrome
 - Williams syndrome
- Autosomal recessive polycystic kidney disease
- Storage diseases
 - Glycogen-storage disease type 1A
 - Hurler mucopolysaccharidosis
 - Lesch-Nyhan syndrome
 - Oxalosis
- -Peds:-nephrocalcinosis is the most common cause (furosemide therapy, vitamin D therapy, RTA, idiopathic hypercalcemia, absorptive hypercalciuria, Williams syndrome)
- -others: newborn dehydration, sickle cell disease, candida, CMV, Lesch-Nyhan syndrome, Glycogen storage disease type 1, Fanconi syndrome)
- -adults: consider medullary sponge kidney, hyperparathyroidism, RTA, gout, hyperuricemia, sickle cell, hypercalcemia/calciuria.
- Brant and Helms, Brant Ultrasound

2005

- Why is nuc med renal scan done in acute pyelonephritis in kids?
 - A. Function
 - B. Scarring
 - C. Look for reflux
 - D. Evaluate for congenital abnormalities

B. Scarring

- Renal Cortical Scintigraphy (Tc99m DMSA)
 - Focal areas of diminished uptake (in 90%)
- Scarring of affected renal lobes often in children + in up to 43% in adults
 - *Dahnert*
- Radioisotopic scanning with technetium dimercaptosuccinic acid is more sensitive than intravenous pyelography for helping detect renal scars. This is the preferred test for many pediatric nephrologists and radiologists because it is sensitive and easy to perform
 - *Emedicine; Chronic Pyelonephritis*

2005

- What should be done if 2cm cyst seen in premenopausal women? (Recall)
 - A. Follow
 - B. Excise
 - C. Do nothing
 - D. Laparoscopy

C: do nothing

- normal up to 2.5 cm. Larger 5 cm unlikely to regress. Larger functioning cysts can have an appearance identical to an ovarian neoplasm and should be followed-up but under 2.5 cm no follow-up is required.
 - *Brant ultrasound*

2005

- At what size would a follicle be ready for ovulation? (Recall)
 - A. 10mm
 - B. 20 mm
 - C. 30 mm
 - D. 40 mm
 - E. 50mm

b. 20 mm

- multiple recalls give 20 mm as the answer also.
 - Brant ultrasound.

2005

- Which of the following is true regarding acquired renal cystic disease of uremia
 - A. Increased incidence compared to the general population
 - B. Regress after transplant
 - C. Ultrasound is the best modality for evaluation

a. Increased incidence compared to the general population

- -I'm going to assume increased compared to general population. Per Dahnert 27-47% after 3 years HD; 80% 4 years, 100%>5 yrs.
- successful transplant prevents occurrence of more cysts and tumor

2005

- Which of the following is best for near-field resolution?
 - A. linear transducer
 - B. phased array
 - C. vector transducer
 - D. Linear array
 - E. focused something

D. linear array

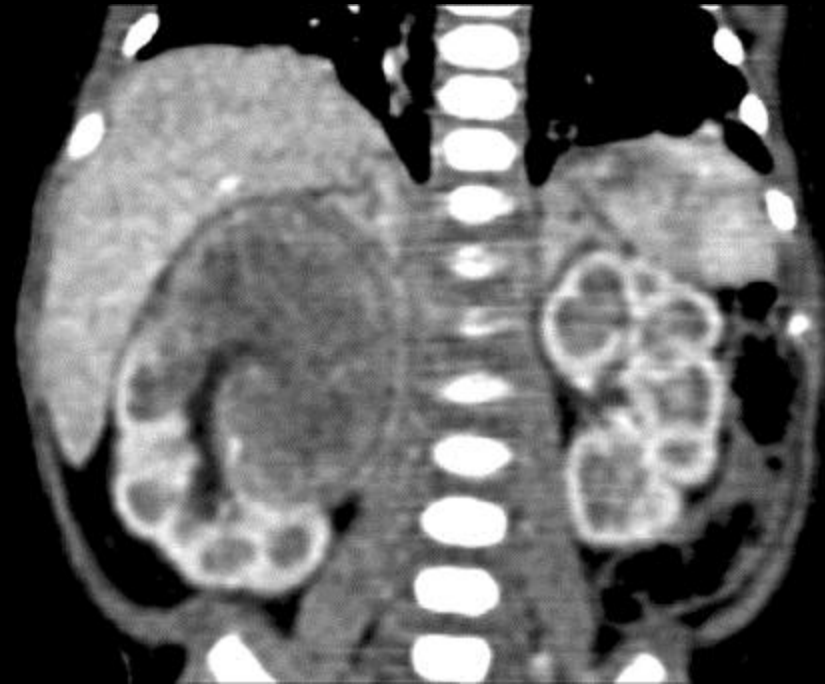
- Just a sample of my many google searches to try to come up with something other than guessing.
“Doctors need a high frequency (7-12 MHz), linear array transducer due to its superb near-field resolution which lets you see structures with exceptional clarity. ... “ Not a good source but seems to be the right answer.
 - HUDA

2005

- A renal mass is identified on an ultrasound of a three month old. What is the most likely Dx?
 - A. Mesoblasticnephroma
 - B. Wilmstumor
 - C. RCC
 - D. Oncocytoma

a. Mesoblastic nephroma

- Incidence: most common renal neoplasm neonate
- Aka...fetal renal hamartoma, aka leiomyomatous hamartoma, aka benign congenital wilms, aka benign fetal hamartoma, aka fetal mesenchymal tumor aka bolande tumor, aka congenital fibrosarcoma, aka fibromyxoma
- 3 months mean age presentation
- M>F
- 14% ass w/ prematurity, polyhydramnios, GI/GU malformations, Neuroblastoma
- replaces 60-90% renal parenchyma
- may extend beyond capsule
- rare calcifications
- No venous extension (DDx from Wilms)



2005

- Dialysis graft failure most commonly occurs at the (multiple repeats)
 - A. Venous anastamosis
 - B. Arterial anastomosis
 - C. Leak from frequent punctures

Venous anastamosis

- Intimal hyperplasia at the venous outflow tract was the most common cause of graft failure
 - *medscape*

2005

- Which of the following is true regarding multilocular cystic nephroma?
 - a) contains central stellate scar
 - b) protrudes into renal pelvis
 - c) malignant
 - d) usually found in the elderly population
 - e) enhances homogeneously

- **protrudes into renal pelvis**



- Multilocular cystic nephroma (MLCN) It is a rare, congenital, BENIGN (*c is false*) tumor. The tumor is most often seen in males younger than 4 and females between 4-20 or over 40 (*d is false*). It may be an incidental finding in adults or may cause hematuria secondary to protruding into the renal pelvis. The tumor contains multiple small cysts of variable size with intervening fibrous septa. There is a single thick capsule surrounding the tumor and the cysts do not communicate with each other. The septae or capsule rarely calcify. The mass often compresses adjacent renal parenchyma and **PROJECTS INTO THE RENAL PELVIS**. but it may be difficult to distinguish from cystic RCC and surgical excision is often necessary for diagnosis. On US, large cystic spaces separated by echogenicstroma or complex/solid mass are seen. The CT appearance is a large hypovascular mass sharply delineated from surrounding parenchyma. Hemorrhage and necrosis are uncommon and a central stellate scar is not seen (*a is false*). The SEPTAE may enhance (*e is false*) with contrast and the mass often **PROTRUDES INTO THE RENAL PELVIS**.

2005

- **On fetal ultrasound, a fetus demonstrates a hypoechoic region in the upper pole of the left kidney. This most likely represents**
 - A. Wilm's tumor
 - B. Mesoblastic nephroma
 - C. Duplication of collecting system with dilated upper pole calyx
 - D. Unilateral autosomal recessive polycystic kidney disease
 - E. Multicystic dysplastic kidney
 - F. Cyst

C. Duplication of collecting system with dilated upper pole calyx

- In peds reqs, ARPKD is hyperechoic (pg 168), mesoblastic nephroma is hypoechoic, although not restricted to the upper pole (pg 172). MCDK is cystic as are dilated collecting systems and cysts (pg 160).

2005

- **Regarding ovarian torsion:**
 - A. Often associated with malignancy
 - B. Doppler excludes torsion
 - C. Most commonly seen in postmenopausal woman
 - D. Findings of ovarian enlargement

D) Findings of ovarian enlargement

- TORSION OF OVARY
 - = result of rotation of ovary on its axis producing arterial, venous, and lymphatic stasis
 - Age: usually affects prepubertal girls, may occur prenatally, increased risk during pregnancy
 - Cause:
 - (1) Enlarged ovary (large cyst / tumor, paraovarian cyst)
 - (2) Hypermobility of adnexa (more frequent in younger children + during pregnancy), excessively long mesosalpinx, tubal spasm
 - severe lower abdominal pain, nausea, vomiting, fever
 - palpable mass in 50%
 - Location: R:L = 3:1
- US:
 - markedly enlarged hypo- / hyperechoic midline mass
 - multiple peripheral cysts (= transudation of fluid into follicles) measuring 8 - 12 mm in diameter (64 - 74%)
 - good sound transmission (vascular engorgement + stromal edema)
 - free fluid in cul-de-sac (32%)
 - absence of Doppler waveforms (not always reliable)
 - $\pm$ complex mass (if secondary to cyst / tumor)
- CT + MR:
 - deviation of uterus to side of torsion
 - engorgement of blood vessels on side of torsion
 - small amount of ascites
 - obliteration of fat planes around torsed ovary
 - lack of enhancement
- Prognosis: spontaneous detorsion is common (history of prior similar episodes)

- In a post-menopausal woman with bleeding, what is the cut-off for normal endometrial thickness?
 - a) 5mm
 - b) 10 mm
 - c) 15 mm
 - d) 20 mm
- **this is a related question:
- -“At what thickness should endometrial biopsy be considered in a post menopausal woman not on hormones?”
 - a. 2 mm
 - b. 5 mm
 - c. 9 mm
 - d. 13 mm
- **Biopsy of the endometrial stripe not on HRT when the stripe is greater than:**
 - 3 mm
 - 5 mm
 - 7 mm
 - 9 mm
 - 11 mm

- **For the questions above, 5mm is the cut-off for normal endometrial thickness in a postmenopausal woman**
- In postmenopausal women, it is considered normal in thickness when it measures 5mm or less. Any focal thickening or an overall thickness greater than 5mm is considered by most examiners to warrant an endometrial biopsy.
 - US Requisites

2005

- A 30 year old post-partum woman has acute L flank pain with fever. A 20-minute contrast-enhanced CT demonstrates increased enhancement of the left kidney. The left kidney is also enlarged. Next day, a non-contrast CT shows persistent enhancement of the left kidney. What is the likely cause of the problem?
 - a) ATN
 - b) renal vein thrombosis
 - c) acute pyelonephritis
 - d) chronic atrophic pyelonephritis

renal vein thrombosis

- Although this question describes a CT scan, it probably relates to nephrographic patterns. Several patterns of kidney enhancement have been described on intravenous pyelography. ① immediate faint persistent nephrogram: caused by impaired glomerular filtration and decreased number of functioning nephrons and is likely due to chronic glomerular disease and atheroembolic disease. ② increasingly dense nephrogram: the kidney is initially faint and becomes dense over several hours to days. This pattern is due to increased tubular transit time and diminished plasma clearance. The differential diagnosis for this pattern includes acute extrarenal obstruction, such as calculus; diminished perfusion pressure as in hypotension; acute tubular necrosis; intratubular obstruction, such as in myeloma nephropathy; acute glomerular disease; and acute renal vein thrombosis. ③ immediate dense persistent nephrogram: caused by unknown mechanism, but is seen in acute tubular necrosis and severe acute pyelonephritis. ④ striated parenchymal nephrogram: this pattern is usually only seen transiently during pyelography and may be due to acute extrarenal obstruction, severe acute pyelonephritis or ARPKD. ⑤ patchy parenchymal nephrogram: differential diagnosis for this pattern includes polyarteritis nodosa, scleroderma, necrotizing angiitis and catheter-induced vasospasm.

2005

- Which of the following is FALSE regarding para-ovarian cysts?
 - a) arise in the broad ligament
 - b) can undergo torsion
 - c) shows cyclic changes
 - d) 10% of adnexal masses

c) shows cyclic changes

- Para-ovarian cysts are simple unilocular adnexal cysts, which arise from the BROAD LIGAMENT (*a is true*), separate from the ovary. They account for 10-20% adnexal masses (***d is true***). The cysts are usually unilateral and simple, but may undergo TORSION (*b is true*), hemorrhage, rupture or malignant degeneration. The cysts demonstrate NO CHANGE IN APPEARANCE OVER TIME (*c is false*).

– Dahnert

2005

- Which of the following is **NOT** a cause for a small, thick-walled bladder?
 - a) spinal cord injury
 - b) bladder sphincter-dyssnergia
 - c) neurogenic bladder
 - d) radiation cystitis
 - e) cytoxan cystitis
- **Which of the following will not give you bladder wall thickening?**
 - a. neurogenic bladder secondary to diabetes
 - b. benign prostatic hypertrophy
 - c. schistosomiasis
 - d. lymphoma

- The differential diagnosis for diffuse bladder wall thickening includes acute infectious cystitis, tuberculosis, schistosomiasis, malakoplakia, radiation and cytoxan cystitis.
- Two types of neurogenic bladder may result from spinal cord injury depending on the level of trauma.
 - Lesions above L2 result in a reflex neurogenic bladder with an inability to initiate or inhibit voiding, increased residual urine and reduced bladder capacity.
 - Lesions below L2 result in an autonomous neurogenic bladder with an inability to initiate voiding, increased residual urine and a flaccid bladder (*a & c may be correct*).
- Detrusor sphincter-dyssnergia occurs with spinal cord injuries above T5 and results in outlet obstruction and increased residual urine.
- **C. neurogenic bladder secondary to diabetes.**
- Diabetic neuropathy usually results in a form of neurogenic bladder called detrusor areflexia. Neurologic damage is focused on the sacral reflex arc, with a loss of perception of bladder distention. Therefore, the bladder just continues to fill until the intravesicle pressure exceeds the intact sphincter mechanisms, and urine just overflow dribbles. There is no functional outlet obstruction here, and the bladder is usually small and thin-walled with an *increased* capacity. *Dunnick 385-392*
- Bladder Wall thickening: > 5 mm nondistended, > 3 mm distended.
 - Causes: Tumor (TCC, lymphoma), Cystitis (radiation cystitis, infectious cystitis, or resulting from inflammatory bowel dz, appendicitis, focal diverticulitis), Outlet obstruction (benign prostatic hypertrophy, urethral stricture), Neurogenic *Primer 356, GU Requisites 205-211, 217-218*
- Schistosomiasis can cause a **thick-walled** fibrotic “flat-topped” bladder with high insertion of ureters. It results in submucosal bladder wall edema that gives the bladder a blurred contour on cystography. Focal strictures and, of course, calcifications can develop. *Dähnert 5th p. 965.*

2005

- Which of the following is NOT characteristic for adenomyosis?
 - a) focal thickening of junctional zone
 - b) diffuse thickening of junctional zone
 - c) largely hypoechoic
 - d) small punctuate hyperechoic foci
 - e) well-defined borders
- **a related question:
- -“All are true of adenomyosis on MRI except?”
 - a. sharp margins
 - b. foci of increased T2 signal
 - c. focal thickening of the junctional zone
 - d. diffuse thickening of the junctional zone
 - e. mostly hypointense

well-defined borders

- Adenomyosis is described as the presence of ectopic endometrial glands and stroma within the uterine myometrium.
- Involvement may be focal or diffuse. The findings on sonography may be subtle, but include thickened or asymmetric uterine walls, enlarged heterogeneous uterus or increasingly heterogeneous myometrial echotexture with multiple tiny cysts (*c,d may be characteristic*).
- MRI is the preferred imaging modality and demonstrates an **ill-defined**, often elliptical, mass isointense to the junctional zone. The mass does not enhance with contrast administration. The JUNCTIONAL ZONE MAY BE FOCALLY OR DIFFUSELY THICKENED
- Ectopic glands are punctate areas of HIGH T2 SIGNAL. Borders of involved areas are IRREGULAR and POORLY DEFINED .

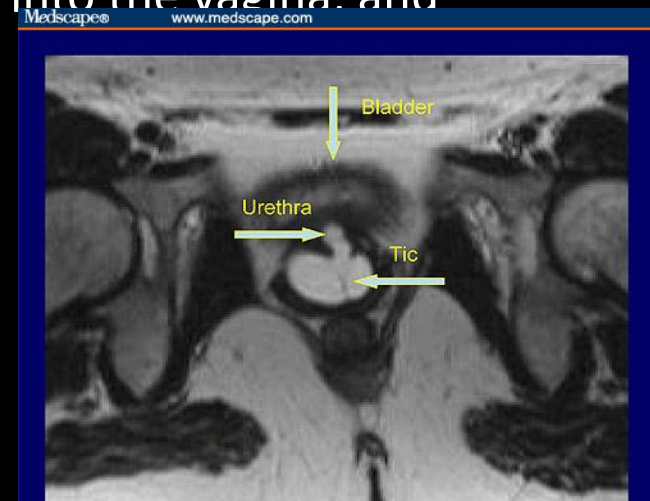


2005

- Question regarding urethral diverticulum in a female. Which is true?
 - a) stress incontinence
 - b) assoc/ with malignancy
 - c) assoc/ with infection
 - d) can be treated by marsupialization of the diverticulum

assoc/ with infection

- Approximately one third of patients present with recurrent urinary tract infections. Chronically infected diverticula may demonstrate no other associated symptoms except for **recurrent urinary tract infections**. At times, the infected diverticulum may progress to an abscess, requiring transvaginal aspiration.
- Stress urinary incontinence may coexist with urethral diverticula
- **Urethral carcinoma** is a rare complication of urethral diverticula
- Female urethral diverticulum is a localized outpouching of the urethra into the anterior vaginal wall
- The most widely accepted theory implicates repeated infections of the periurethral glands with subsequent obstruction eventually evolving into urethral diverticula.
- Multiple open surgical and endoscopic approaches have been described for the treatment of urethral diverticula. They include transurethral saucerization of the diverticulum, marsupialization of the diverticular sac into the vagina, and excision of the diverticulum.
 - Emedicine



- Urethral diverticula are common in adult females, occurring in as many 16% of all women. They typically arise from the **posterior wall of the urethra**, bulging into the vagina or vaginal introitus. Occasionally, they arise laterally or anteriorly. The origin is unknown. Most are probably acquired, though some can be congenital. Possible disguised causes include infection and obstruction of periurethral glands, and trauma from childbirth or repeated catheterization. Symptoms are often nonspecific, consisting of urgency, frequency, dysuria, dyspareunia, recurrent urinary tract infection, dribbling, and incontinence. Careful examination may demonstrate a palpable tender suburethral mass. Occasionally pus may be expressed from such a mass, or it may contain a palpable stone, or even a hard nodule due to complicating carcinoma.
- Urinary frequency and urgency (40-100%)
- Dysuria (30-70%)
- Recurrent UTI (30-50%)
- Postmicturition urinary dribbling (10-30%)
- Dyspareunia (10-25%)
- Hematuria (10-25%)
- Less commonly reported symptoms included stress or urge incontinence, pelvic or suprapubic pain, perineal pain, pelvic pressure, urinary hesitancy, purulent urethral discharge, feeling of incomplete emptying, urinary retention, and isolated terminal dysuria. Surgery is the mainstay of therapy for urethral diverticulum. The choice of surgical procedure depends largely on the location of the diverticulum along the urethra. Simple marsupialization may be appropriate for diverticula with ostia emptying into the distal one third of the urethra, although not all authorities advocate this approach. If the ostium of the diverticulum lies distal to the urethral rhabdosphincter, then incision into the posterior urethral wall to achieve exteriorization of the diverticular sac is thought to have no adverse effect on continence.
- Diverticula involving the middle or proximal one third of the urethra are treated most effectively with either total excision or partial ablation. Each procedure has advocates; however, partial ablation generally is considered simpler and less likely to result in urethrovaginal fistula. This especially may be true if significant peridiverticular inflammation is present, if the sac is adherent to the posterior urethra, or if tissue planes are obscured. A third, more conservative approach has been described for use under these adverse surgical conditions. This technique involves a small transvaginal incision into the sac of the diverticulum followed by copious irrigation with an antiseptic solution and packing of the diverticular lumen with Oxycel. The resultant extensive fibrosis is thought to close the diverticulum from within.

2005

- 327) Transitional zone
- 328) Peripheral zone
- 329) Central zone
- Most frequent site of carcinoma
- Largest glandular zone
- BPH
- 327-C, 328-A, 329- (the peripheral zone is the largest before age 40 and then the transitional starts getting larger with BPH)

2005

- Approximately 70% of CAP cases arise in peripheral zone
- The transition zone is the origin of BPH
- The peripheral zone constitutes almost 75% of the normal prostate gland
 - *emedicine;; Transrectal US*

2005

- **Which of the following is true regarding prostate carcinoma?**
 - a. Most hypoechoic lesions are malignant
 - b. The majority of lesions are found in the transitional zone
 - c. Metastatic disease is most common to the lungs
 - d. Anal probing is contraindicated within 1 week of TURP
 - e. PSA levels are initially higher for prostate CA than for benign prostatic hypertrophy

- E. PSA levels higher for prostate cancer than BPH
- Malignant lesions are hypoechoic, but hypoechoic lesions aren't all malignant only 20-30%
- from the web: "In general, prostate **cancer** increases **PSA** levels more than **BPH** does and so it is likely that prostate **cancer** will cause **PSA** to rise more quickly""
- In the prostate, 70% of cancers occur in the peripheral zone (PZ), and approximately 20% are found in the transition zone (TZ).
- On T1-weighted images, the prostate appears homogeneous with medium signal intensity.
- On T2-weighted images, cancer appears as an area of low signal intensity in the hyperintense PZ
- On US, the most frequently noted abnormality due to prostate cancer is a hypoechoic area in the PZ with increased flow



2005

- Regarding lymphoma of the kidney
 - a. hypoechoic
 - b. More often hodgkin's than NHL
 - c. Often with enhanced through transmission
 - d. Not associated with any other organ involvement

Hypoechoic

- Primary renal lymphoma is rare, but the kidneys are a common EXTRANODAL site for LYMPHOMA METASTASES. The process is usually by hematogenous dissemination or direct extension from adjacent retroperitoneal disease. Usually other sites of disease dominate the clinical picture. Renal lymphoma occurs more commonly in NHL, than in HD. CT findings include MULTIPLE homogenous round masses with diminished enhancement, solitary mass, diffuse infiltration, or direct extension from surrounding tissues and adjacent lymphadenopathy. The process is USUALLY BILATERAL. US findings include HYPOECHOIC mass(es) with little to no through transmission. Hydronephrosis may be present.
 - *US Requisites 125-126*

2005

- A 34 year old with hypertension not responsive to captopril, hypokalemia, metabolic alkalosis most likely has?
 - a. adrenal adenoma
 - b. pheochromocytoma
 - c. juxtaglomerular apparatus tumor
 - d. FMD

(a) adrenal adenoma

- Adrenal Adenoma (Conn's Syndrome) produces aldosterone which give hypokalemia and alkalosis
- JGA tumor makes renin (angiotensinogenase, converts to angiotensin I). Captopril would inhibit ace transformation (angiotensin I to angiotensin II) and therefore this is not the answer
- Pheo leads to HTN

2005

- Which is true regarding ureteral pseudodiverticulosis?
 - a. congenital
 - b. involves distal ureter
 - c. increased risk of ureteral rupture
 - d. premalignant condition

Premalignant condition

- Ureteral pseudodiverticulosis is an uncommon, ACQUIRED disorder of the ureters (*a is false*). Patients have a history of urinary tract infection, urinary obstruction or urolithiasis – the disease is also associated with HIV infection. Hyperplastic transitional epithelium invaginates into the lamina propria, giving the appearance of diverticula. The process is usually bilateral and occurs in the PROXIMAL AND MIDDLE THIRDS (84%) of the ureters (*b is false*). Retrograde or antegrade pyelography demonstrates tiny outpouchings along the ureter, which are in continuity with ureter. They usually do not change over time. There may be association with urothelial **malignancy in 30% patients**. (*No reference to increased risk of ureteral rupture was made in any information I found*).
 - Ureteral Pseudodiverticulosis; Radiology

- The spectrum of responses of the ureter to inflammatory stimuli is rather narrow. In rare cases inflammation may lead to ureteral pseudo-diverticulosis. At present, both etiology and microscopic anatomy of this condition are not fully elaborated due to scarcity of material. Fine mucosal irregularity is seen in any type of acute urinary tract inflammation. It is caused by subepithelial leucocytic infiltration and mucosal edema.

Chronic conditions in which amyloid deposition occurs in the same layers, cause a coarser irregularity of the ureteral wall, which may resemble malignancy. Ureteris cystica and profunda has been shown to be capable of distorting the ureteral folds and cause undulating contours with small outpouchings of less than 4 mm in size. These are called pseudodiverticula. This phenomenon is associated with hyperplasia of the transitional epithelium, forming glands of Brunn. When the intra-mural process extends and becomes macroscopically visible, pseudopolypoid filling defects, representing fluid-filled subepithelial cysts, can be observed on urography.

Actually a macroscopically visible pseudodiverticulum represents a downward proliferation of the lamina propria into the loose connective tissue. Studies on surgical specimens revealed that the pseudodiverticula contain all of the muscle layers of the normal ureter.



Patients with ureteral pseudodiverticula have symptoms of urinary tract infection and often hematuria. Most cases reported in the literature concern males between 40 to 85 years of age. Male to female ratio is 6: 1. The radiological appearance of pseudodiverticulosis is characteristic. The pseudodiverticula present a multiple, small (2-4 mm in diameter), contrast-filled pouches in the wall of the proximal or middle ureter. Visualization is better on antegrade or retrograde ureterography than on IVU. The ureteral pseudodiverticula can easily be differentiated from true or false ureteral diverticula. The latter are usually single, unilateral and larger than 5 mm in diameter.

2005

- Regarding urethral stricture, which is true?
 - a. catheter associated strictures occur at the penoscrotal junction
 - b. gonococcal infection results in short strictures

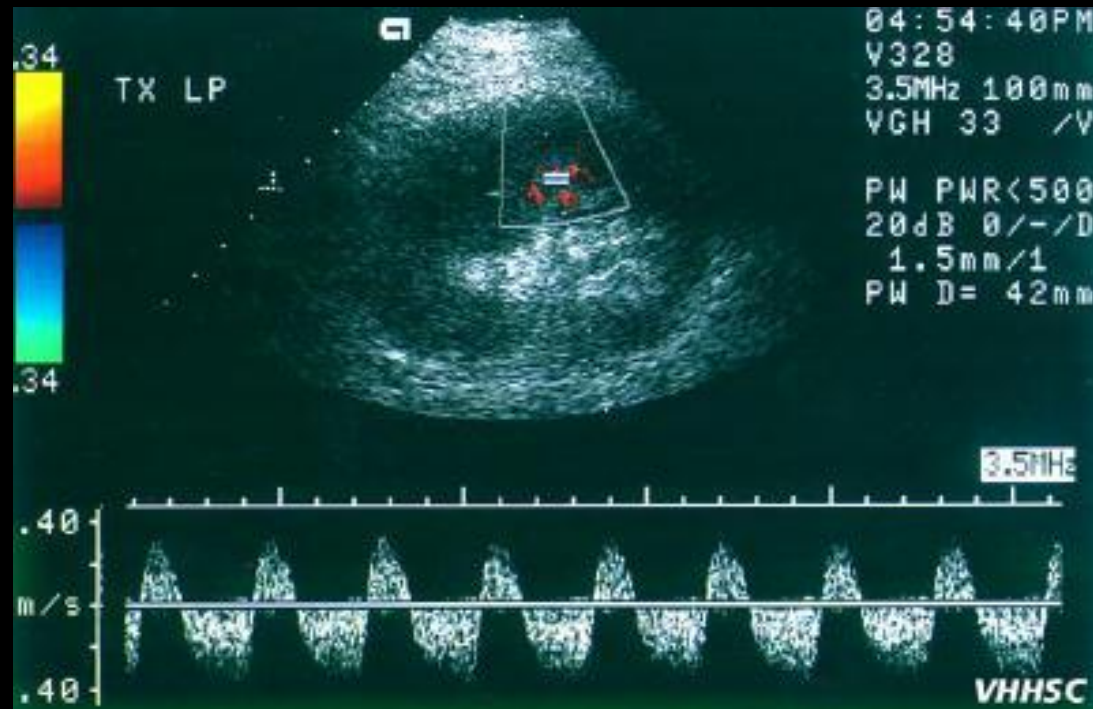
catheter associated strictures occur at the penoscrotal junction

- Catheter-associated strictures are due to pressure necrosis and most commonly affect penoscrotal junction (70-80%) because this junction is one of the fixation points of the urethra (*a is true*). The suspensory ligament fixes the urethra at this level and the membranous urethra is fixed by the urogenital diaphragm. Inflammation or superimposed infection may extend proximally and distally, resulting in a long, irregular stricture –centered at the penoscrotal junction. Strictures may also be due to the lack of or inadequate treatment of gonococcal infection. The result is a hard fibrous scar, centered at the bulbous urethra (70%). Infection may spread proximally and distally to the scar, resulting an irregular, long segment stricture (*b is not true*). Gonococcal strictures are responsible for 40% of urethral strictures. Strictures may also occur after pelvic trauma. Specifically, post-traumatic posterior urethral strictures may develop after partial or complete urethral tears. Post-traumatic anterior urethral strictures are associated with straddle injuries. They are centered at the proximal bulbous urethra, but typically involve a short segment.

2005

- A patient is several days post op from a renal transplant and has decreased urine output and reversed flow in diastole?
 - a. renal vein thrombosis

renal vein thrombosis



2005

- Which of the following is the most common testicular neoplasm?
 - a. seminoma
 - b. lymphoma
 - c. non-seminomatous germ cell neoplasm

seminoma

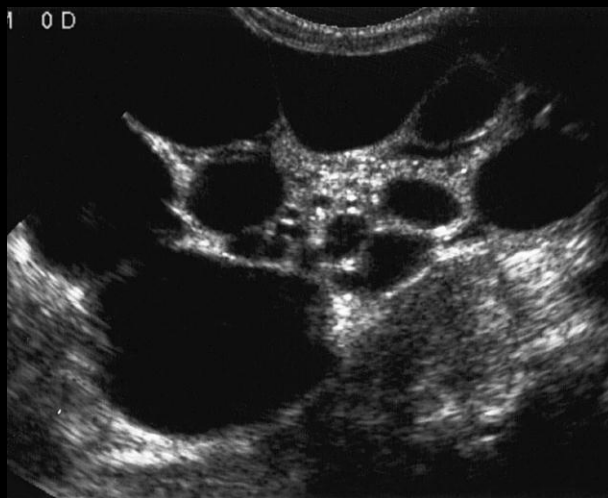
- Most testicular tumors present as a painless, palpable mass and the subtypes are largely indistinguishable from each other on sonography. Orchiectomy is performed for diagnosis. Biopsy is only rarely indicated in cases of known extratesticular primary tumors, in which metastatic disease is a consideration. Intratesticular neoplasms may be categorized as ① germ cell tumors, which comprise 90% of all testicular tumors, ② stromal cell tumors, which make up 5%, and ③ secondary tumors, which are responsible for 5% of all testicular neoplasms. Among germ cell tumors, seminomas are the most common and comprise 40% OF ALL TESTICULAR NEOPLASMS (***a is the most common***). Seminomas most commonly present in the 4th decade. They are well-circumscribed with homogenous hypoechoic echotexture on ultrasound. Non-seminomatous germ-cell tumors include embryonal carcinoma, choriocarcinoma, teratoma, yolk sac/endodermal sinus tumors, but often are mixes of 2 or more tumor types. They often present at a higher stage than seminomas and may be poorly defined and heterogeneous on sonography. Stromal cell tumors – Leydig cell, Sertoli cell or granulosa cell – are hypoechoic well-circumscribed masses on sonography. 10% of stromal cell tumors are malignant. Secondary tumors include lymphoma, leukemia and metastases. In men over 50, metastases are more common than germ cell tumors in the testes. Testicular metastases are usually multiple and bilateral. Lymphoma may be primary or systemic and on ultrasound, presents as multiple ill-defined masses.

2005

- In multicystic dysplastic kidney:
 - a. the most common contralateral association is another MCDK
 - b. the renal pelvis or ureter is atretic
 - c. there is hypertension

the renal pelvis or ureter is atretic;

- *Dahnert*
- It is a non-hereditary form of renal disease of unknown pathogenesis. MCDK is the second most common cause of an abdominal mass in the neonate (following hydronephrosis). It is reported to occur more often in males. The disease is typically unilateral and occurs more often in the left kidney. If bilateral, the disease is lethal (*a is incorrect*). The affected kidney is a collection of irregularly sized cysts and dysplastic tissue – no functional renal parenchyma is present. Typically, the entire kidney is diffusely involved, but segmental or focal involvement is possible. The risk of malignant transformation is low and surgery is not necessary. If undetected during childhood, the disease may be discovered incidentally in adulthood (*c is incorrect*). Two forms of MCDK are described: ①pelvoinfundibular atretic and ②hydronephrotic. In the pelvoinfundibular atretic form, a cluster of thin-walled cysts is held together by connective tissue. The ipsilateral URETER and renal artery are ATRETIC (***b is correct***) and the collecting system is absent. The hydronephrotic form may be due to an in utero infection with UPJ or UVJ obstruction - the kidney then retains a reniform shape and the collecting system is dilated to the level of the obstruction.



2005

- Young kid (prepubertal) with tumor in testicle, most likely:
 - a) seminoma
 - b) yolk sac tumor
 - c) mixed germ cell tumor
 - d) choriocarcinoma
 - e) embryonal tumor

Yolk sac tumor

- **Classification of malignant tumors of the testicle**
- Germ cell tumors (GCTs) account for nearly all (95%) of primary testicular tumors. The GCT line is fairly evenly split between seminomas (45%) and nonseminomas (50%). Of the nonseminomas, mixed GCTs are most common (40%). Teratomas and teratocarcinomas are considered malignant in adults and constitute 30% of nonseminomatous lesions. The embryonal cell tumor is the classic pure-cell, nonseminomatous tumor and is relatively uncommon (20%). Choriocarcinoma represents the most lethal but least common (1%) nonseminomatous type.
- Yolk sac tumors, which are also known as endodermal sinus tumors, are the most common prepubertal GCTs. They may be benign, but most often, they are malignant. Most affected patients require surgery and chemotherapy because of the aggressive nature of the tumors, but the overall prognosis is excellent.
- Among nongerminal testicular tumors, stromal Leydig cell tumors and Sertoli cell tumors constitute the remaining 5% of primary testicular tumors; these are rare tumors that are malignant in only about 10% of the cases.
- Lymphoma, leukemia, and melanoma are the most common malignancies that metastasize to the testicle.

2003

- Which of the following is the cause of Meig's syndrome?
 - a. IVC clot
 - b. colon CA
 - c. ovarian fibromas

C. Ovarian fibroma



- Meigs' syndrome complicates ~1% of ovarian fibromas and is defined as ascites and pleural effusions accompanying a fibrous ovarian tumor (usually fibromas). Resolves with removal of tumor.
- ***Dahnert 5th 1050***
- [Ultrasound](#) typically shows a solid uniformly hypoechoic mass, with very marked sound attenuation.
- [CT](#) demonstrates a well-defined solid homogeneous or mildly heterogenous mass with little or no enhancement.
- [MRI](#) findings are those of a solid mass with **low T1 and T2 signal intensity** (Fig.1). Occasionally, [cystic](#) degeneration or [calcification](#) may be detected at imaging.
- Fibromas are bilateral in 3 10% of cases. Multiplicity, bilaterality, and [calcification](#) are characteristic of the ovarian fibromas that develop in young women with the [basal cell naevus syndrome](#).
 - *medcyclopedia*

- Most reliable ultrasound sign that differentiate mature teratoma from ovarian cystadenoma?
- a. Cystic
- b. Doppler flow in septation wall
- c. Posterior acoustic enhancement
- d. Markedly hyperechogenic focus

Markedly hyperechogenic focus

- **U/S usually demonstrates a complex mass that is highly echogenic due to the hair or calcification**

- What is the active agent in renovascular hypertension?
- a. Renin
- b. Aldosterone
- c. Angiotensinogen
- d. Angiotensin I
- e. Angiotensin II
- f. ADH

Angiotensin II

- Renal artery occlusion creates ischemia, which triggers the release of renin
 - and a secondary elevation in blood pressure. Hyperreninemia promotes conversion
 - of angiotensin I to angiotensin II, causing severe vasoconstriction and
 - aldosterone release.
-
- Define Active? Renin is the trigger - does the term renin - dependent
 - renovascular hypertension. However, the agent that actually produces the
 - hypertension is AG2 - vasoconstriction and Aldo - salt/water retention

- Seminal vesicle cysts most commonly associated with?
- a. Ectopic insertion of the ipsilateral ureter into the bladder neck/urethra
- b. Ipsilateral renal agenesis
- c. Ipsilateral ectopic ureterocele
- d. Duplication of the collecting system
- e. Contralateral ectopic ureterocele

Ectopic insertion of the ipsilateral ureter into the bladder neck/urethra

- For the second set of recalls here: see Dahnert
- Ectopic insertion occurs 92% [bladder neck, prostatic urethra; seminal vesicle]
- Ipsilateral renal agenesis occurs (80%)
- Duplicated collection system (8%)

- What is the most common cause of squamous cell carcinoma in the renal pelvis?
- a. Analgesic abuse
- b. Malakoplakia
- c. Cyclophosphamide
- d. Chronic infected staghorn calculus

Chronic infected staghorn calculus

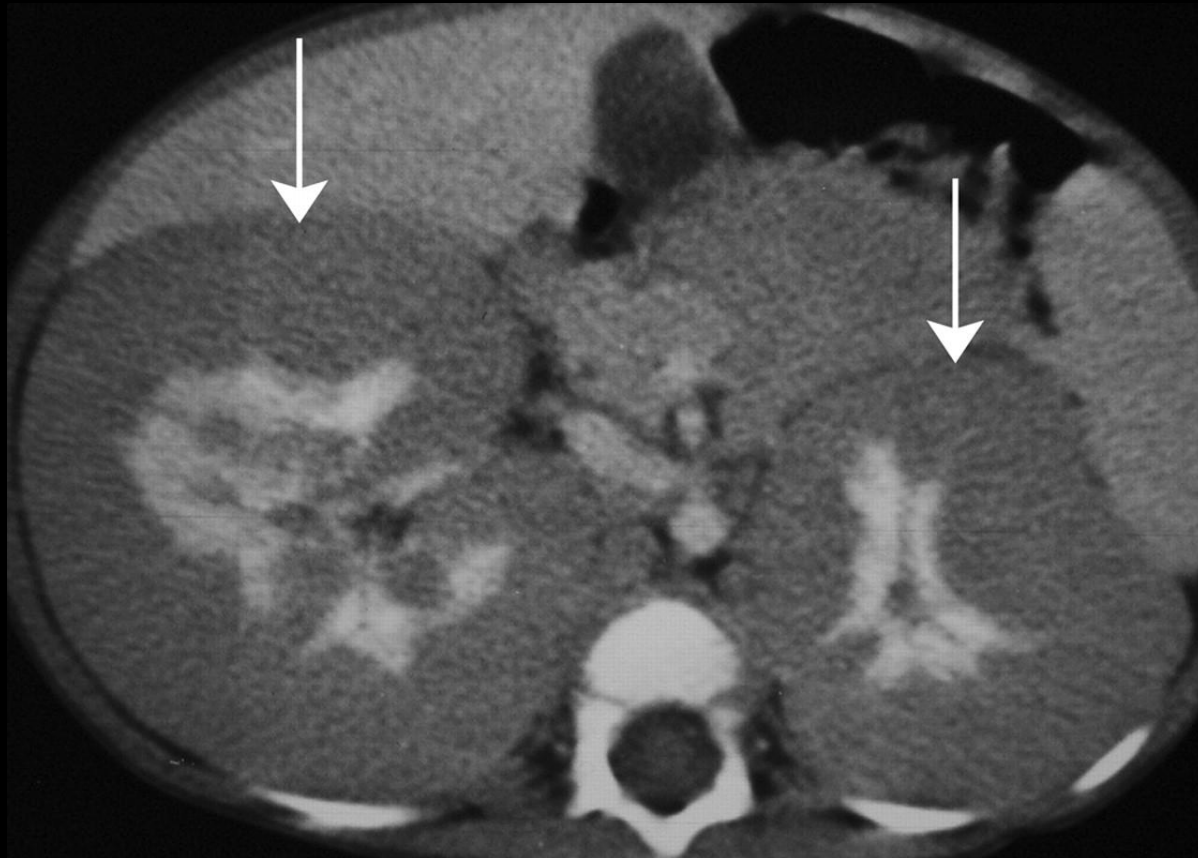
- **174. Renal medullary hyperechogenicity in neonate is NOT associated with**
- A hypercalciuria
- B nephroblastomatosis
- C chronic Lasix therapy
- D medullary cystic disease

B nephroblastomatosis

- Options A, C, D are associated with cortical hyperechogenicity. Cortical hyperechogenicity and frank kidney stones can be seen in children with hypercalciuria and after prolonged Lasix therapy (Nephron. 1998;79(3):269-73.)
- Kidneys with nephroblastomatosis appear enlarged, lobular, and echogenic, or enlarged with diffuse hypoechoic thickening of the cortex. (Fundamentals of Radiology, pp. 1185-6). Medullary cystic disease also causes renal cortical hyperechogenicity. Other causes of cortical hyperechogenicity that could be found in the neonate include infantile polycystic kidney disease, Meckel-Gruber syndrome (with encephalocele, microcephaly, and polydactyly), trisomy 13 (also with polydactyly and CNS anomalies), and autosomal dominant polycystic kidney disease (when picked up in neonate). (J Clin Ultrasound) 1998 May;26(4):203-6)

Nephroblastomatosis

- 9-month-old boy with nephroblastomatosis. Axial contrast-enhanced CT image shows that kidneys are bilaterally enlarged due to cortical hypodense, non-enhancing, soft-tissue mass (arrows). Note distorted renal parenchyma centrally. *AJR*



- The reason for inhibition of ureteral reflux in normal patients is which one of the following:
 - anatomy of the vesicoureteral junction
 - ureteral peristalsis
 - detrusor contraction
 - low hydrostatic pressure in noncontracting urinary bladder

A. anatomy of the vesicoureteral junction

– *Textbook of Urology*

- A male presents with multiple strictures in the urethra on urethrogram. The most likely cause is :
 - Prostatitis
 - Gonococcal infection
 - Previous instrumentation

Previous instrumentation

- Gonococcal stricture involves bulbar urethra; multiple and serial
- **Previous instrumentation.** This was reviewed by Brent Wagner, MD at the AFIP as a 'written boards question.' Since the advent of antibiotic therapy for sexually transmitted diseases, iatrogenic or post-instrumentation of the male urethra is the most common etiology for stricture formation. The two classic locations for strictures post instrumentation are at the penoscrotal junction and the confluence of the bulbomembranous urethra. The most common instrument to cause urethral damage is the rigid rectoscope used in TURP procedures (incidence as high as 14%). Also remember that Gonococcus is responsible for approximately 40% of urethral strictures in the U.S. (Dunnick, 414-21, AFIP (Wagner, B) p. 470, God – personal communication)

- Horseshoe kidney associated with:
 - VUR
 - common pelvic outlet obstruction
 - stones
 - ureteral-pelvic stenosis
 - hypertension

Ureteral-pelvic stenosis

- Ureteropelvic junction (UPJ) obstruction is a common complication, possibly because of the high insertion of the ureter. *Emedicine*
- Horseshoe kidney is associated with UPJ obstruction (30%) and duplication anomalies. The only listed association in Dunnick is the UPJ obstruction. MGH lists the duplication anomalies as well. No mention is made in any of these with hypertension, common pelvic outlet obstruction, or stones. Dunnick mentions that renal calculi bring these patients to medical attention and the horseshoe kidney is diagnosed incidentally. There has been reported increased risk of trauma due to a more anterior location and less overall protection from intervening structures. (Dunnick 19, MGH 771)

- Primary megaureter associated with:
 - contralateral renal agenesis
 - ipsilateral cryptorchidism
 - delayed ureteral emptying
 - bladder outlet obstruction

Answer: delayed ureteral emptying

- An aperistaltic juxta vesical segment secondary to faulty development of the muscle layers of the ureter (functional, non- mechanical obstruction) leads to the wave of peristalsis being not preceded by a wave of relaxation so that contrast medium fails to pass freely downwards .
- **Radiological features :**
 - Dilatation of ureter most marked in pelvic segment and less or absent in upper ureter.
 - Normal calibre of the just above uretero vesical junction which allows easy passage of a catheter.
 - Localised dilatation of lower segment of lower segment with gradual tapering undulated terminal segment.
 - Dilatation may involve entire ureter but pelvicalyceal system is not proportionately dilated.
 - Aperistaltic terminal segment.
 - **Delayed ureteral emptying.**
 - Though dilated ureter is not tortuous.
 - http://www.kem.edu/dept/radiology/case06_99.htm

- Contralateral renal agenesis (9-15%)
 - *Emedicine; Obstructed Megaureter*
- Associated anomalies are rare with primary megaureter (<5%) and include:
- *Ipsilateral*: calyceal diverticulum and papillary necrosis
- *Contralateral*: reflux, ureterocele, ureteral duplication, renal ectopia or agenesis, UPJ obstruction.
- (MGH 773, in Dunnick 326-7 there is only mention of UPJ obstruction and contra-lateral renal agenesis)

- Which structure supports pelvic visceral structure?
 - iliococcygeal muscle
 - pubococcygeal muscle
 - urogenital diaphragm.

pubococcygeal muscle

- The pubococcygeus muscle or PC muscle is a hammock-like muscle, found in both sexes, that stretches from the [pubic bone](#) to the [coccyx](#) (tail bone) forming the floor of the [pelvic cavity](#) and supporting the pelvic organs. It is part of the [levator ani](#) group of muscles.
 - *Wikipedia & Radiographics; Practical MR Imaging of Female Pelvic Floor Weakness1*

- Which of the following is NOT associated with tuberous sclerosis?
 - a. rhabdomyoma
 - b. astrocytoma
 - c. angiomyolipoma
 - d. sphenoid dysplasia

D. Sphenoid dysplasia

- a. Rhabdomyoma: cardiac rhabdomyomas
- b. Astrocytoma: subependymal astrocytoma in 15%
- c. Angiomyolipoma: in 40-90%
- d. sphenoid dysplasia: seen in neurofibromatosis and other syndromes, but not TS
- ***Dahnert 5th 325-326; 175***

- 20 y/o with a urachal cyst is at risk for
 - infection
 - tumor
 - dribble

infection

- Patent urachal anomalies do not usually cause significant morbidity or mortality. However, adenocarcinoma has been reported in adults in urachal remnants, presumably from chronic inflammation and infection
 - *emedicine; Bladder Anomalies*
 - *Urachal Cyst; Eastern Journal of Medicine*

- Urachal cysts can develop infection or adenocarcinoma but infection is probably more common (Dunnick doesn't even mention tumor). Also urachal remnants can communicate with the umbilicus and leak urine through the umbilicus. Calculi have also been reported in urachal cysts. I think the answer is B.
- Urachal cyst is a fluid-filled structure occurring in between the two obliterated ends of the urachus, ie, the umbilicus and bladder dome. Most occur in the distal third of the urachus. In infancy, such cysts are rarely symptomatic, but they are detected with increasing frequency as an incidental finding during bladder ultrasonography in children undergoing evaluation for other reasons (eg, prenatal hydronephrosis, urinary tract infections). More commonly, the urachal cyst is detected in early childhood or adolescence. Symptoms are generally related to infection and the resultant inflammation and include suprapubic mass, fever, pain, and bladder or irritative voiding symptoms. The peritoneum alone separates the cyst from the intra-abdominal cavity, so the inflammatory process may involve the adjacent intra-abdominal contents, resulting in abdominal pain. Death from intra-abdominal rupture has been reported.



- Which of the following does not cause endometrial thickening?
 - a. polyps
 - b. adenomyosis
 - c. tamoxifen
 - d. hyperplasia

B. Adenomyosis

- All cause thickening of the endometrium except adenomyosis.
- Adenomyosis is a focal or diffuse invasion of the myometrium by endometrium, which in turn causes myometrial hyperplasia.
- Adenomyosis may cause “pseudowidening” of the endometrium due to increased myometrial echogenicity
- ***Dahnert 5th 1004, 1022***

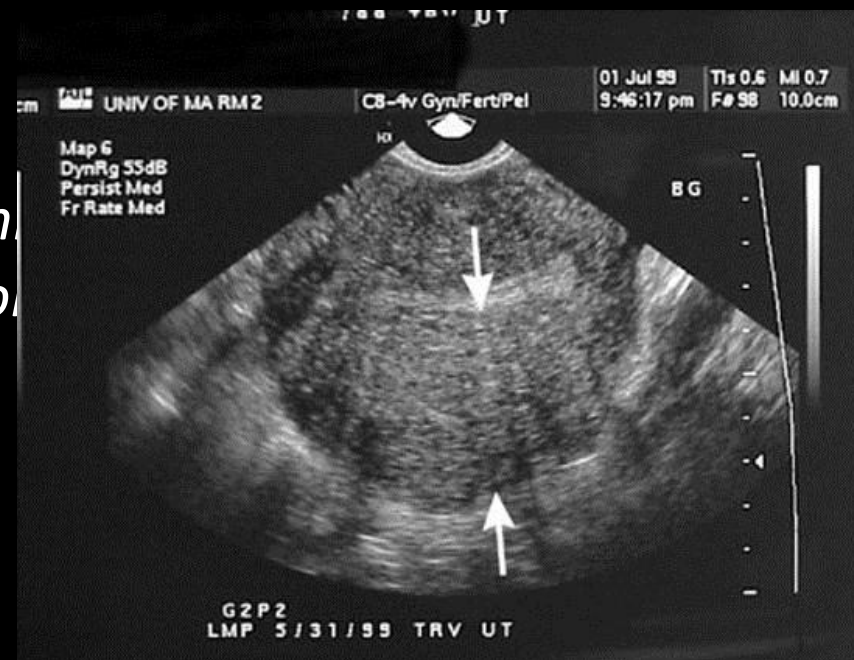
- The most specific sign of endometriosis on ultrasound is:
 - a. Thickening/widening of the subendometrial hypoechoic stripe
 - b. Heterogeneous echogenicity in the myometrium
 - c. focal hypoechoic area in myometrium
 - d. cystic area beneath endometrium

Heterogeneous echogenicity in the myometrium

- On sonograms, the most common appearance of adenomyosis is areas of decreased echogenicity or heterogeneity in the myometrium

— *Emedicine*

- *Transvaginal sonogram of an endometrium with a thickened posterior myometrium (arrows).*



- Which is of the following most commonly predisposes to adenomyosis
 - a. previous C-Sections
 - b. multiple pregnancies
 - c. multiple gestations
 - d. history of pelvic inflammatory disease
 - e. placenta accreta

B. multiple pregnancies

- Adenomyosis affects premenopausal and perimenopausal women, usually those who are multiparous and older than 30 years
 - www.emedicine.com

- Which of the following is true regarding adenomyosis?
 - a. Ultrasound is useful in distinguishing between adenomyosis and leiomyomas.
 - b. Adenomyosis is dark on T2-weighted MRI
 - c. Hysterosalpingogram is useful in the diagnostic evaluation

Adenomyosis is dark on T2-weighted MRI.

- Prior to MRI, the diagnosis was made at surgery because it was not possible to differentiate focal adenomyosis from leiomyomas clinically or sonographically.
- MRI is the exam of choice for evaluating adenomyosis. Accuracy of MRI in distinguishing adenomyosis from leiomyomas is reported as high as 90%. Two forms of adenomyosis exist: diffuse and focal. (My answer to this question refers to the signal characteristics of the focal form only) In diffuse adenomyosis, the uterus is diffusely enlarged and demonstrates **diffuse or segmental thickening (>12mm)** of the low signal intensity **junctional zone on T2 images**. Foci of high signal can be seen within the adenomyosis. If increased signal is seen on T1 and T2, it is thought to represent hemorrhage. Focal adenomyosis (adenomyoma) presents as a mass of low signal intensity on T2 images. It can simulate a leiomyoma with differentiation dependent on the shape and margin of the lesion. Callen, *Ultrasonography in OB and GYN*, 947-948.

— *emedicine*

- MR findings in adenomyosis:
- a. increased T2 signal in vesicles
- b. asymmetric junctional zone
- c. thickened junctional zone with discrete margins

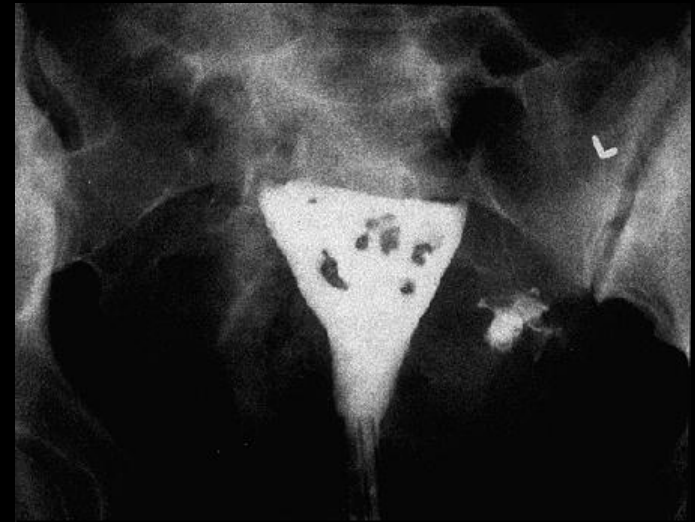
asymmetric junctional zone

- adenomyosis could be diagnosed with a high degree of accuracy when the junctional zone thickness was 12 mm or greater
- The most common lesion of adenomyosis seen on magnetic resonance images is a low–signal-intensity area on T2-weighted images that often gives the appearance of diffuse or focal widening of the junctional zone
- The bright foci seen in the myometrium on T2-weighted images in 50% of patients (see Image 3) are islands of heterotopic endometrial tissue, cystic dilation of heterotopic glands, or hemorrhage
 - *emedicine*

- Which of the following is the best way to diagnose Asherman's syndrome (intrauterine synechiae)?
 - a. Ultrasound
 - b. MRI
 - c. Hysterosalpingogram
 - d. CT w/ contrast
 - e. PET

C. Hysterosalpingogram

- HSG:
 - Solitary or multiple filling defects
 - Bands of tissue traversing endometrial cavity
 - Irregularity of endometrial cavity
 - Partial or near complete obliteration of uterine cavity
- SHG:
 - Echogenic bands bridging the uterine cavity
- ***Dahnert 5th 1023***



- A 3 cm 'polypoid-like' lesion extending into the endometrial canal in a premenopausal female has the following MR characteristics: T1 and T2 hypointense. What is the most likely etiology?
 - a. endometrial polyp
 - b. adenomyosis
 - c. fibroid
 - d. endometrial carcinoma

Answer: Fibroid

- On [MRI](#), T1-weighted images demonstrate endometrial polyps as intracavitary filling defect of medium signal intensity, similar to the signal intensity of normal endometrium. On T2-weighted scans polyps may image with signal intensity similar to or slightly lower than the endometrium, and they may be seen to cause widening of the endometrial cavity (Fig.2). Endometrial polyps [enhance](#) after [intravenous](#) gadolinium.
- Fibroids are T1 and T2 hypointense.

- Polyps are more common than pedunculated submucosal fibroids. Polyps tend to be hyperechoic, fibroids hypoechoic with shadowing. Polypoid fibroids account for only about 2.5% of all fibroids.
- **Dahnert 5th 1004-1005, 1062-1063**
- **A. BENIGN**
 - 1. Uterine fibroids (99%)
 - 2. Pyometra
 - 3. Hemato- / hydrocolpos
 - 4. Transient uterine contraction (during pregnancy)
 - 5. Bicornuate uterus
 - 6. Adenomyosis
 - 7. Intrauterine pregnancy
 - 8. Lipoleiomyoma (<50 cases in world literature)
- **B. MALIGNANT**
 - 1. Cervical carcinoma
 - 2. Endometrial carcinoma
 - 3. Leiomyosarcoma
 - 4. Invasive trophoblastic disease
- **Endometrial polyp**
- **= focal hyperplasia of stratum basale; in 20% multiple**
- **Age: mainly 30 - 60 years**
 - **Histo: projections of endometrial glands + stroma into uterine cavity**
 - **(a) hyperplastic polyp resembling endometrial hyperplasia**
 - **(b) functional polyp resembling surrounding endometrium (least frequent)**
 - **(c) atrophic polyp**
 - **enlarged cystically dilated glands**
 - **well-defined homogeneous hyperechoic intracavitary mass**
 - **heterogeneous texture suggests infarction, cystic changes, hemorrhage**
- **Malignant transformation: in 0.4 - 3.7%**

- A 65 yo male patient has hematuria and a filling defect in the renal collecting system on IVP. Non-contrast CT showed a mass in the collecting system, with HU density of 75. Likely cause?
 - a. transitional cell carcinoma
 - b. squamous cell carcinoma
 - c. fungus ball
 - d. urate stone

- A 51 y/o male with hematuria undergoes an unenhanced CT scan of the abdomen and pelvis which demonstrates a mass within the left renal collecting system that has a density of 75 Hounsfield units. Which of the following is the most likely etiology?
 1. transitional cell carcinoma
 2. fungus ball
 3. acute blood clot

- **A. Transitional cell carcinoma**
 - 85% of all urothelial tumors/ primary renal pelvic tumors
 - ***Dahnert 5th 971-972***
-
- **Acute blood clot**

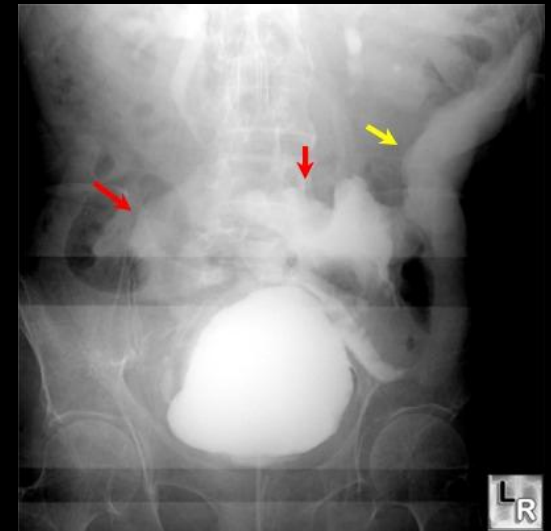
- A 51 y/o male status post MVA with an abdomen and pelvic CT that demonstrates extensive perinealextravasation from an extraperitoneal bladder rupture. What is the most likely associated finding?
 - a. intraperitoneal bladder rupture
 - b. straddle/urethral injury
 - c. pelvic ring fractures

C. Fracture of Pelvic Ring

- Extraperitoneal bladder rupture (80%) is associated with pelvic fractures (sharp bony spicule) or avulsion tear at fixation points of puboprostatic ligaments. Occur anterolaterally near base of bladder.
- Intraperitoneal bladder rupture (20%) is associated with invasive procedures (cystoscopy), stab wounds, surgery or blunt trauma with distended bladder. Occur at dome of bladder.
 - **Dahnert 5th 975**



Extraperitoneal rupture



Intraperitoneal
rupture

- Which of the following are true concerning prostate cancer?
 - a. all hypoechoic lesions in the peripheral zone represent carcinoma
 - b. T2 hyperintense
 - c. Endorectal coils for MR is contraindicated status post transrectal prostatic biopsy
 - d. PSA values are lower for BPH versus prostate cancer

PSA values are lower for BPH versus prostate cancer

- PSA density and PSA velocity are greater than in BPH
- Prostate cancer tends to be low signal on T2WI
- Prostate cancer usually hypoechoic on US, but hypoechoic lesions are very nonspecific.
- ***Dahnert 5th 940-941***
- http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=9494502
- ***above site used endorectal coils s/p transrectal prostatic biopsy ... therefore not contraindicated.***

- Which of the following does not cause peritoneal seeding (drop mets) that may mimic ovarian carcinoma?
 - a. stomach
 - b. breast
 - c. pancreas
 - d. kidney
 - e. liver

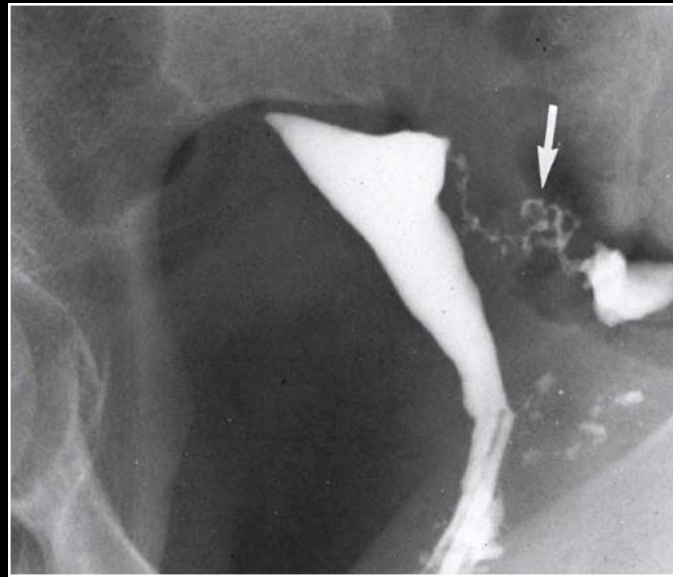
D. Kidney

- Peritoneal metastases occur in ovarian, stomach, colon, pancreas, breast, uterine and bladder (TCC) cancers.
- No mention of peritoneal metastases in HCC or RCC.
 - ***Dahnert 5th 850, 852, 714, 950***
- General google search reveals HCC does seed
- Fear of tumor seeding in the peritoneal cavity, renal fossa, or trocar sites leads many laparoscopic surgeons to remove kidney specimens intact. However, to date there are no reports of peritoneal seeding or local tumor recurrence in the renal fossa following LRN
 - *Laparoscopic Radical Nephrectomy: Morcellate or Leave Intact? Definitely Morcellate!; Urology*

- **Salpingitis isthmica nodosa (SIN) is associated with:**
 - a. Hydrosalpinx
 - b. Endometriosis
 - c. Adenomyosis
 - d. Congenital uterine abnormalities
 - e. uterine hyperplasia

- **Salpingitis isthmica nodosa (SIN) is associated with:**
 - a. Hydrosalpinx
 - b. Endometriosis
 - c. Adenomyosis
 - d. Congenital uterine abnormalities
 - e. uterine hyperplasia

- SIN characterized by tubal irregularity, multiple diverticula & tubal obstruction on HSG
- SIN associated with **PID**, infertility and ectopic pregnancy
- Salpingitis in general is associated with hydrosalpinx
 - *Dahnert 5th 1052; US Reqs 2nd 573-576*
- Chronic inflammation of the fallopian tubes may lead to salpingitis isthmica nodosa (SIN). This condition is diagnosed by HSG with multiple diverticulæ filling the lumen of the fallopian tube. They occur in clusters. The diverticulæ are cavities in small nodules of post inflammatory tissue. HSG demonstrates signs of prior PID such as tubal occlusion and hydrosalpinx. SIN is associated with increased risk of tubal ectopic pregnancy and decreased fertility. (*Dunnick 496-7*)



- **Most frequent complication of Inflammatory Bowel Disease in the GU tract:**
 - Rectovesical fistula
 - Stones
 - TCC
 - RCC
 - Obstruction

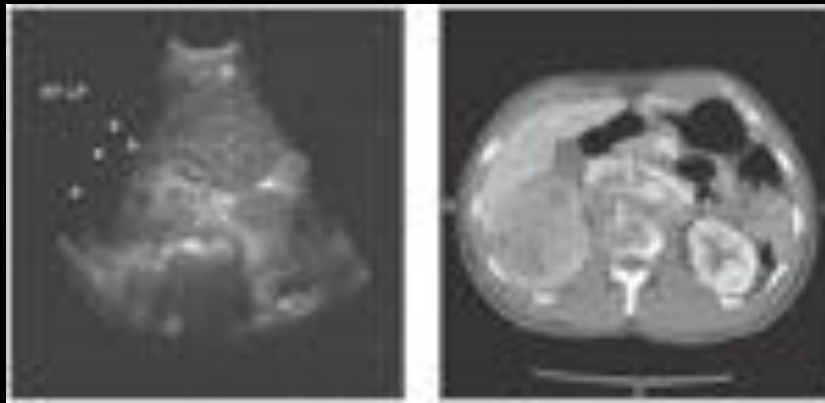
B. Stones

- This seems to be the recurring answer on numerous old recalls, but I can't find a good answer to this anywhere.
- Urolithiasis is listed first in Dahnert under GU manifestations of Crohn's disease. (7.2%)
- Calcium oxalate stones
- ***Dahnert 5th 810***

- **Patients with sickle cell trait are increased risk for which of the following renal tumors?**
 - a. Renal medullary carcinoma
 - b. Angiomyolipoma
 - c. Transitional cell carcinoma
 - d. Oncocytoma
 - e. Renal cell carcinoma

A. Renal medullary carcinoma

- Occurs almost exclusively in young adult blacks with sickle cell trait/ hemoglobin SC, but NOT with sickle cell/ hemoglobin SS disease.
- Highly aggressive, dismal prognosis.
 - *Dahnert 5th 926*



- **Following transplant, reversed flow in the renal artery during diastole is most likely due to:**
 - a. ATN
 - b. renal artery stenosis
 - c. renal vein thrombosis
 - d. acute rejection
 - e. urinary obstruction

C. renal vein thrombosis

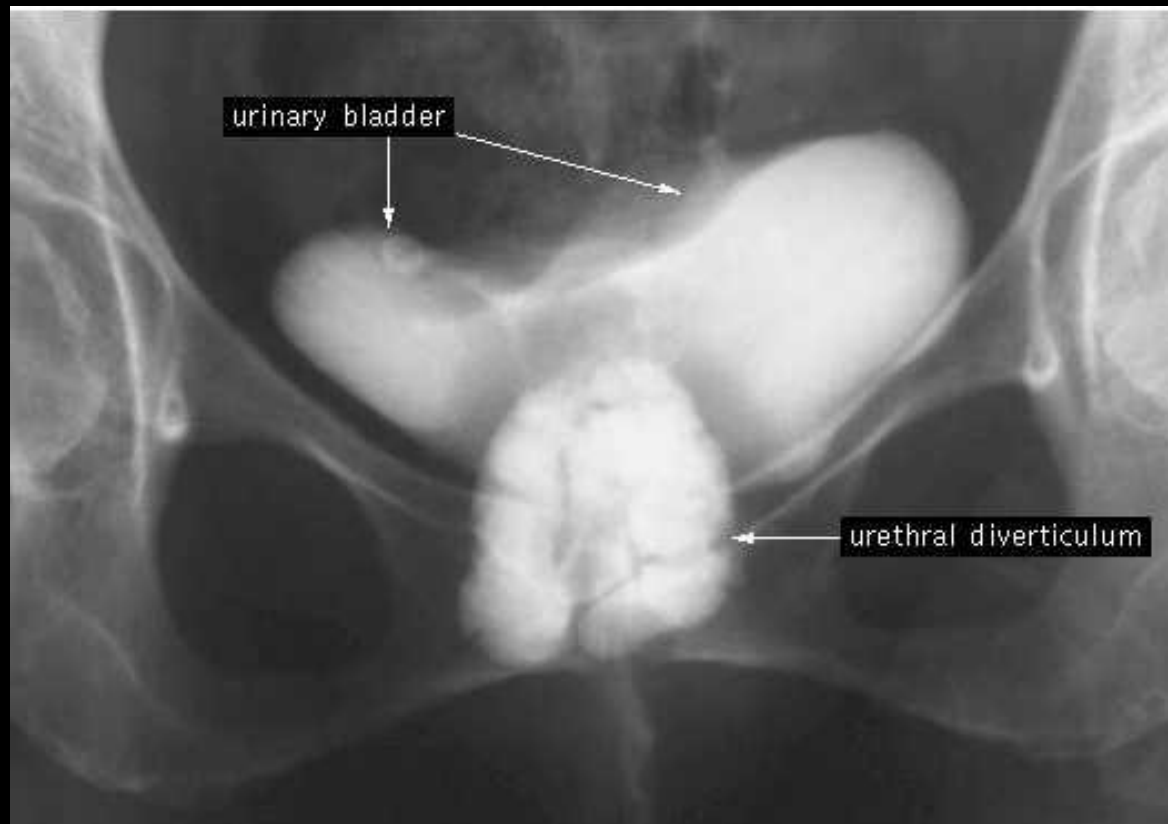
- Seen in acute rejection, renal vein thrombosis and ATN.
 - *Dahnert 5th 958, 955*

- A 41 y/o female notices postvoid dribbling. A cystogram demonstrates smooth rounded extrinsic impression upon the inferior bladder. Pt has post void dribbling and elevated base of the bladder. What is the associated abnormality?
 - a. ureterocoele
 - b. urethral diverticulum
 - c. ectopic ureteral insertion
 - d. Hutch diverticulum

C. urethral diverticulum

- Postvoid dribbling seen in urethral diverticulum as opposed to constant dribbling in infrasphincteric insertion of ectopic ureterocele.
 - ***Dahnert 5th 977, 979***
- Presenting symptoms are classically described as the triad of postvoid dribbling, dysuria, and dyspareunia
 - *EMEDICINE*

Female
prostate
sign



- Patients with **urethral diverticulae** often complain of post-void dribbling. These patients also have symptoms of chronic infections with peri-urethral inflammation and edema.
- **Mullerian duct remnants** are referred to as Mullerian duct cysts, and although they are attached to the verumontanum (dorsal elevation in the prostatic urethra), they have no connection with the urethra (I'm not sure how that happens). These patients present, in their 3rd or 4th decades, with pain, hematuria, symptoms of obstruction or infection.
- **Ectopic ureterocele**s are always associated with ipsilateral complete duplication and is always associated with the upper moiety ureter. These are often stenotic and are associated with hydronephrosis involving the upper pole. The lower pole experiences VUR. Some ectopic ureteroceles may course submucosally through the bladder neck and may terminate in the posterior urethra, where a widely patent orifice is the rule instead of the stenosis described above. There is reflux across this during voiding.
- **Vesico-vaginal fistulae** result in painless CONSTANT dribbling of urine from the vagina (no temporal association with voiding) that commonly result following hysterectomy or other pelvic surgery and particularly if preoperative radiation is administered. This often results (75% of cases) following hysterectomy for benign etiologies.
 - (Dunnick 30-8, 366)

- A man with pelvic pain undergoes an abdominopelvic CT which demonstrates a cyst in the pelvis between the bladder and prostate gland and absence of a kidney in the right renal fossa. The right renal fossa findings can best be explained by which of the following:
 - a. Renal agenesis
 - b. Crossed fused ectopia
 - c. Horseshoe kidney
 - d. Pelvic kidney

A. ipsilateral renal agenesis

- Seminal vesicle cysts associated with ipsilateral mesonephric duct anomalies
 - Ectopic insertion of ipsilateral ureter (92%)
 - Ipsilateral renal dysgenesis (80%)
 - Collecting system duplication (8%)
 - Vas deferens agenesis
 - ***Dahnert 5th 965***
- Renal agenesis = complete congenital absence. 1 in 1000 births. d/t failure of formation of ureteral bud or defic of metanephric blastema. No renal art, ipsilat trigone or ureteral orifice in bladder. Adrenal gland usually present. Compensatory hypertrophy of contralat kidney. Assoc w/ genital abnormalities d/t affected mesonephric duct. Males: may have ipsi seminal vesicle cysts (common), absence of ipsi vas deferens, hypoplasia or agenesis of testicle, & hypospadias. Females: may have unicornuate or bicornuate uterus, hypoplasia/absent uterus or vagina. Bilat renal agensis rare & fatal, M>F (3:1), Potter's facies (w/ low set ears).
 - (Dunnick, Textbook of Uroradiology, 3rd ed, 16-7 & 38)

- A patient presents for renal ultrasound secondary to microscopic hematuria. The scan demonstrates a 'cyst-like' structure within the renal parenchyma. Which of the following is the most likely etiology?
 - a. lymphoma
 - b. metastases
 - c. reninoma
 - d. renal cell carcinoma
 - e. Angiomyolipoma
 - f. TCC

A. Lymphoma

- Renal lymphoma can appear as single or multiple anechoic/ hypoechoic masses +/- increased through transmission.
 - *Dahnert 5th 924*
- 5-7% of RCC's are cystic variety

- 64 y/o male with long standing hypertension undergoes an abdomen MR with in and out of phase imaging, which demonstrates signal dropout of a 2 cm adrenal lesion. The most likely cause is which of the following:
 - a. nonfunctioning adrenal adenoma with essential hypertension
 - b. hyperfunctioning adenoma consistent with Conn's disease
 - c. reninoma
 - d. hyperfunctioning adenoma consistent with Cushing's disease
 - e. pheochromocytoma

nonfunctioning adrenal adenoma with essential hypertension

- Unilateral adrenal mass <3cm is benign in 87% of cases
- Unilateral adrenal mass >5cm is likely malignant
 - ***Dahnert 5th 871***
- Question about adrenal adenoma on In-phase and out-phase MR.
- REFERENCE: Smelka, Abdomino-Pelvic MRI
- Adrenal adenomas can be divided into two categories, nonhyperfunctioning and hyperfunctioning. But in radiology, we cannot distinguish between them. The majority of adenomas are homogeneously iso- or hypo-intense in comparison to the normal adrenal gland on T2 images. Adrenal metastases tend to be hyperintense on T2 images. Contrast enhancement is variable, but uniform enhancement of the entire adrenal lesions on immediate post-Gd capillary-phase images is common for adenomas (up to 70%) and rare for other masses of the adrenal gland. Adrenal adenomas display a drop in signal on out-of-phase sequence images up to 80% of the time secondary to their intracytoplasmic lipid content, and this method is the most accurate for demonstrating that a mass is an adenoma. T1 weighted sequences with fat suppression techniques have also been employed, but I don't know how often it identifies an adenoma.

- **A patient has a NORMAL IVP exam. On the follow day he has a BE. The scout film shows bilaterally dense nephrogram. The most likely source of this problem is?**
 - a. Contrast induced renal failure
 - b. Obstruction
 - c. Nephropathy
 - d. The bogus answers keep changing year to year.

a. Contrast induced renal failure

- ***Dahnert 5th 915-916***

Persistent Nephrogram

A. BILATERAL GLOBAL

1. Systemic hypotension
2. Intratubular obstruction from protein:
Tamm-Horsfall, Bence Jones, myoglobin
3. Tubular damage by contrast material

B. UNILATERAL GLOBAL

1. Renal artery stenosis
2. Renal vein thrombosis
3. Urinary tract obstruction

C. SEGMENTAL

1. Obstructed moiety of duplicated collecting system
2. Obstructing renal calculus
3. Obstructing neoplasm
4. Focal stricture
5. Focal parenchymal disease:
tubulointerstitial infection

- **25 yo with one year h/o of nephrotic syndrome presents with acute flank pain, gross hematuria, and enlarged kidney and persistent nephrogram on IVP. Most likely dx:**
 - a. Pyelonephritis
 - b. Renal vein thrombosis
 - c. Obstructing UVJ calculus
 - d. Hemorrhage nephritis

b. Renal vein thrombosis

- Nephrotic syndrome (membranous and membranoproliferative glomerulonephritis) is most common cause of RVT in adults.
 - ***Dahnert 5th 961***

- **Regarding Conn's syndrome, which is NOT seen?**
 - a. Hybernatriemia
 - b. Hypokalemia
 - c. Hypertension
 - d. Increased renin
 - e. Increased aldosterone

d. Increased renin

- Conn syndrome consists of hyperaldosteronism most commonly caused by adrenal adenoma, less frequently adrenal hyperplasia or adrenal carcinoma.
- Hypertension secondary to hypernatremia
- Hypokalemia
- Metabolic alkalosis
- Suppressed plasma renin levels
 - ***Dahnert 5th 915***

- What is the primary mechanism of renal excretion of intravenous contrast for IVP?
 - a. Glomerular filtration
 - b. Tubular secretion
 - C. Glomerular filtration and tubular secretion
 - D. Tubular secretion and distal tubular resorption

Glomerular filtration

- At our institution, we use Omnipaque for IVP's
- Following intravascular injection, OMNIPAQUE is distributed in the extracellular fluid compartment and is excreted unchanged by glomerular filtration.
 - *Omnipaque company*

- All of the following are characteristic of acquired cystic renal disease EXCEPT?
- a. Most cysts are 5 mm in size or less
- b. Bilateral disease is only found 50% of the time
- c. Is associated with an increased risk of renal cell carcinoma
- d. Worsens with increased duration of renal failure

Bilateral disease is only found 50% of the time

- **During an IVP a patient becomes tachycardic and hypotensive. Which of the following is NOT an appropriate therapy?**
 - a. atropine
 - b. iv fluids
 - c. epinephrine
 - d. Trendelenburg position
 - e. oxygen

a. Atropine

- Hypotension with tachycardia is treated with:
 - Leg elevation and Trendelenberg position
 - Oxygen
 - IV fluids
 - Epinephrine, and possibly dopamine
- Atropine is used in case of vasovagal reaction (hypotension and bradycardia)
 - ***Dahnert 5th Front and Back covers***

- **Which does not cause bladder wall calcifications?**
 - a. TB
 - b. Schistosomiasis
 - c. Malacoplakia
 - d. Transitional cell carcinoma
 - e. Cystitis

c. Malacoplakia

- Causes of bladder wall calcification include:
 - Schistosomiasis, TB, cystitis (post XRT, alkaline, cytoxin), primary bladder cancers, urachal carcinomas
- Malakoplakia
 - Dome shaped smooth mural filling defects, scalloped appearance if lesions are confluent, generalized pelviureteral dilatation (if obstructive)
 - ***Dahnert 5th 889, 924***

Bladder Wall Calcification

A. INFLAMMATION

1. Schistosomiasis (50%)
 - ✓ relatively normal distensibility of bladder
 - ✓ thin arcuate pattern of calcification
2. Tuberculosis
 - ✓ bladder markedly contracted
3. Cystitis:
 - postirradiation cystitis, alkaline encrusted cystitis, cytotoxin cystitis
4. Bacillary UTI (extremely uncommon)
5. Encrusted foreign material

B. NEOPLASM

1. Primary neoplasm of bladder: TCC, squamous cell carcinoma, leiomyosarcoma, hemangioma, neuroblastoma, osteogenic sarcoma
2. Urachal carcinoma

mnemonic: "SCRITT"

Schistosomiasis

Cytotoxin

Radiation

Interstitial cystitis

Tuberculosis

Transitional cell carcinoma

- **Which of the following is false concerning varicoceles?**
- a. is seen in 10-20% of males
- b. mostly asymptomatic
- c. more common on the right side
- d. associated with infertility
- e. endovascular treatment has cure rates approaching 100%-66-70% improved sperm bulk
- f. surgical and catheter directed therapies are equivalent in their outcomes
- g. increases with valsalva maneuver

c. more common on the right side

- Dahnert 5th 982-983
- Location: left side (78%), bilateral (16%), right side (6%)
- Etiology:
 - (1) Incompetent / absent valve at level of left renal vein / IVC on right side
 - (2) Compression of left renal vein by tumor, aberrant renal artery, obstructed renal vein
- Incidence:
 - (a) clinical varicocele: in 10-15% of adult males, in 21-39% of infertile men
 - (b) subclinical varicocele: in 40-75% of infertile men
- Theoretical causes for infertility:
 - (1) increase in local temperature (2) reflux of toxic substances from adrenal gland (countercurrent exchange of norepinephrine from refluxing renal venous blood into testicular arterial blood at the level of the pampiniform plexus) (3) alteration in Leydig cell function (4) hypoxia of germinative tissue due to venous reflux resulting in venous hypertension + stasis
- Sx's: scrotal pain, scrotal swelling, abnormal spermatogram (impaired motility, immature sperm, oligospermia)
- If there is an ISOLATED right-sided varicocele, there is an obligation to rule out underlying retroperitoneal mass (and possible malignancy – see below for further details). The reason for this is that the left spermatic vein drains into the left renal vein which may be compressed by the superior mesenteric artery, whereas, the right spermatic vein drains into the IVC.

- Varicoceles are associated with:
 - a.pampiniform plexus
 - b.testicular vein
 - c.scrotal vein
 - d.dermal vein
 - e.Santorini plexus

Pampiniform plexus

- **Answer (a) are associated with dilated veins of the pampiniform plexus.**
 - (MGH 304)

- Renal obstruction with low HU ureteral mass:
 - a. uric acid
 - b. indinavir
 - c. struvite
 - d. Xanthine

Indinavir

- Previously CT was thought to identify all urinary calculi with clarity but it cannot reliably confirm the presence of indinavir calculi.
 - *IMAGING CHARACTERISTICS OF INDINAVIR CALCULI; The Journal of Urology*
- Rarely, pure matrix stones may demonstrate soft-tissue opacity on CT scans, and indinavir stones appear lucent. However, all other stones appear opaque on CT scans.
 - *emedicine*

- **Pt with chronic obstruction secondary to stones now presents with mass in left renal pelvis**
 - a. squamous cell
 - b. transitional cell
 - c. fungus ball
 - d. stones

a. squamous cell

- SCC of kidney associated with chronic irritation of urothelium by renal infection and calculi.
 - *Dahnert 5th 966*
 - *Primer*

- A 50 y/o male has biopsy proven squamous cell carcinoma of the renal pelvis. What is the most likely etiology?
 - a. tuberculosis
 - b. chronic infected staghorn calculus
 - c. analgesic abuse
 - d. aniline dye exposure

chronic infected staghorn calculus

- www.emedicine.com
- Squamous cell carcinoma comprises 1-7% of upper tract urothelial tumors. Squamous cell carcinoma frequently is associated with infected staghorn calculi that have been present for a long duration.

- **Which of the following is true about Glucophage?**
 - a. If a patient has had Glucophage in the last 48 hours, iodinated contrast is contraindicated.
 - b. it causes renal failure if contrast is given
 - c. it is associated with lactic acidosis in patients with poor renal function
 - d.

c. it is associated with lactic acidosis in patients with poor renal function

- *Dahnert 5th 1125*

- Which of the following diseases is associated with bilaterally small kidneys?
 - a. HIV nephropathy
 - b. Lymphoma
 - c. Medullary cystic disease
 - d. Medullary sponge kidney

Medullary cystic disease

- characterized by medullary cysts and tubulointerstitial
- HIV, lymphoma and obstruction associated with large kidneys
- Medullary sponge kidney usually has normal size kidneys
 - *Dahnert 5th 873, 925*

- **Regarding prostate CA MRI?**
 - A. Increased T2 signal compared to regular peripheral zone
 - B. Placement of endorectal coil contraindicated s/p prostatectomy
 - C. Occurs in the peripheral zone

Occurs in the peripheral zone

- “Outer gland tumors (posterior and peripheral location), 70%. Inner gland tumors (anterior and central location), 30%; inner gland tumors are not as rapidly invasive because of the presence of the surgical capsule and because there is no neurovascular bundle supply.”
- “MRI: Cancers are hypointense relative to peripheral zone on T2W images. 30% of all prostate cancers are undetectable by MRI.”
 - *From Weissleder 3rd edition, page 323.*

- **SCCA of the bladder most associated with**
 - A. analgesics
 - B. TB
 - C. Malakoplakia

TB

- Squamos Cell Carcinoma
 - Calculi
 - Chronic Infection, leukoplakia
 - Schistosomiasis
 - Primer

- **Regarding varicoceles, which is true?**
 - A. sclerotherapy has same outcome as surgical treatment
 - B. Right side more common
 - C. Surgical treatment same rate of cure as embolization

Surgical treatment same rate of cure as embolization

- Surgical treatment is the most common therapy. Embolization outcome (measured as sperm count increase and successful impregnation) has been cited to be equivalent to surgical treatment.
- Percutaneous varicocele embolization versus surgical ligation for the treatment of infertility: changes in seminal parameters and pregnancy outcomes. J Vasc Interv Radiol. 1997 Sep-Oct;8(5):759-67.
- “Varicoceles represent dilated veins of the pampiniform plexus. They result from incompetent or absent valves in the spermatic vein. Varicoceles occur in 15% of adult males.
- 90% of all varicoceles occur on the left side (drainage of left spermatic vein into the left renal vein at a right angle). 25% of varicoceles are bilateral. A solitary right-sided varicocele requires the exclusion of an underlying malignancy (tumor obstruction).
- From Weissleder 3rd edition, page 327.

- The most common cause of menstrual bleeding in a 65 yo postmenopausal woman with a 4mm endometrial stripe on vaginal US is which of the following:
 - a. Endometrial hyperplasia
 - b. Endometrial atrophy
 - c. Endometrial polyps
 - d. Endometrial carcinoma

Atrophy

- A postmenopausal woman has an ultrasound which shows a 3.5 cm cyst in the adenexa which has a single, thin septation. The most appropriate next step is:
 - a. CT scan in 3 months
 - b. Laporoscopy
 - c. Surgical remove(follow-up ultrasound was not a choice)

Surgical remove

- Three sources below – general consensus would be to take this out.
- Any complex cyst in a post-menopausal (PM) pt OR simple cyst >5cm, consider surgery. In PM patients, ignore simple cysts measuring <1.6cm. Simple cysts measuring 1.6 – 5.0cm, F/U US in 4 mo. (Wagner – AFIP).
- A septated cyst in a postmenopausal patient >3cm → surgical exploration (Mass Gen p838)
- Simple cyst in PM patient less than or equal to 5cm → F/U, if greater than 5cm, consider surgical removal or close F/U.
- Any complex cyst, including septations or solid nodules, surgery is recommended (Rumack p546)

- Which of the following statements is true?
 - Tamoxifen therapy is associated with endometrial hyperplasia and cystic changes on transvaginal US
- Tamoxifen has weak estrogenic activity therefore is associated with hyperplasia, polyps and cancer. Cystic changes occur in the subendometrial zone (Callan p841, Mass Gen p313)

- **Most common configuration for twin-twin transfusion and stuck twin**
 - A. Monochorionic, monoamniotic
 - B. Dichorionic, diamniotic
 - C. Dichorionic, monoamniotic
 - D. Monochorionic, diamniotic

Monochorionic, diamniotic

- Stuck twin = one twin with IUGR residing within an oligo-/anhydramniotic sac of a diamniotic twin pregnancy
 - *Dahnert*
- Monozygotic twins with monochorionic, diamniotic placentation (see Media File 1) or monochorionic, monoamniotic placentation are at risk for TTTS
 - *emedicine*

- **what is best to differentiate mature cystic teratoma from regular ovarian neoplasm?**
- **a. Increased echogenicity (answer)**

2002

- **Which of the following is true regarding aldosteronomas?**
 - a. often multiple
 - b. low renin
 - c. hyponatremia
 - d. medullary location
 - e. histology identical to cortisol tumors

B. Low renin

- Approx 70% of primary hyperaldosteronism is caused by a solitary adrenal adenoma (Conn's syndrome). Clinically patients present with polyuria, hypokalemia, diastolic hypertension, hypernatremia, and signs of total-body potassium depletion. Aldosterone is produced in the adrenal cortex and aldosteronomas are also located there. Renin produced by the kidney in response to dropping GFR.
 - *Genitourinary Requisites* 366-367 and *Nuclear Medicine Requisites, 2nd ed* 380-384
 - ***Dahnert 5th 915***

- **In a renal duplication which of the following is true?**
 - a. upper pole ureter inserts superior/lateral to inferior pole ureter
 - b. upper pole ureter inserts medial/inferior to lower pole ureter
 - c. the upper pole refluxes and the lower pole obstructs
 - d. occurs more often in males than females.

B. upper pole ureter inserts medial / inferior to lower pole ureter

- Weigert-Myer rule: the upper pole of a kidney drains via the ectopic ureter which inserts inferior and medial to the normal, expected ureteral insertion point. Ectopic ureterocele occurs in 1/3 of patients with duplicated ectopic ureters. The upper pole moiety ureter is subject to obstruction & dysplasia of that portion of the kidney; the lower pole ureter typically refluxes due to its shortened tunnel into the bladder. M:F = 1:2 *Genitourinary Requisites, 157; Dähnert 5th p. 977.*

- **Which of the following is not associated with Wilms tumor?**
 - a. Beckwith-Wiedemann syndrome
 - b. Hemihypertrophy
 - c. Inherited aniridia
 - d. Nephroblastoma

C. Inherited aniridia

- Patients with aniridia who have a positive family history (inherited form) are not at an increased risk for Wilms tumor; however, patients with **aniridia without a positive family history (sporadic form) have a 30% chance** of developing Wilms tumor. Wilms tumor (= nephroblastoma) is associated with sporadic aniridia (in 33%), hemihypertrophy, Drash syndrome (pseudohermaphroditism, glomerulonephritis, Wilms' tumor), Beckwith-Wiedemann syndrome (macroglossia, omphalocele, visceromegaly), and Nephroblastomatosis. Nephroblastomatosis is a precursor to Wilms.
- Wilms tumor *is* a nephroblastoma
 - *Primer, 839-840; Dähnert 5th p. 984*
- **WAGR Syndrome:** Wilms, Aniridia (sporadic), Genitourinary anomalies, Retardation (mental)

- **Which is true regarding MRI imaging of adrenal adenoma?**
 - a. on gradient echo: increased signal on in phase and out of images
 - b. on gradient echo: decreased signal on in phase/ increased on out of phase
 - c. on gradient echo: iso to slightly increased signal on in phase and decreased on out of phase
 - d. on T1: : iso to slightly increased signal on in phase and decreased on out of phase

on T1: : iso to slightly increased signal
on in phase and decreased on out of
phase

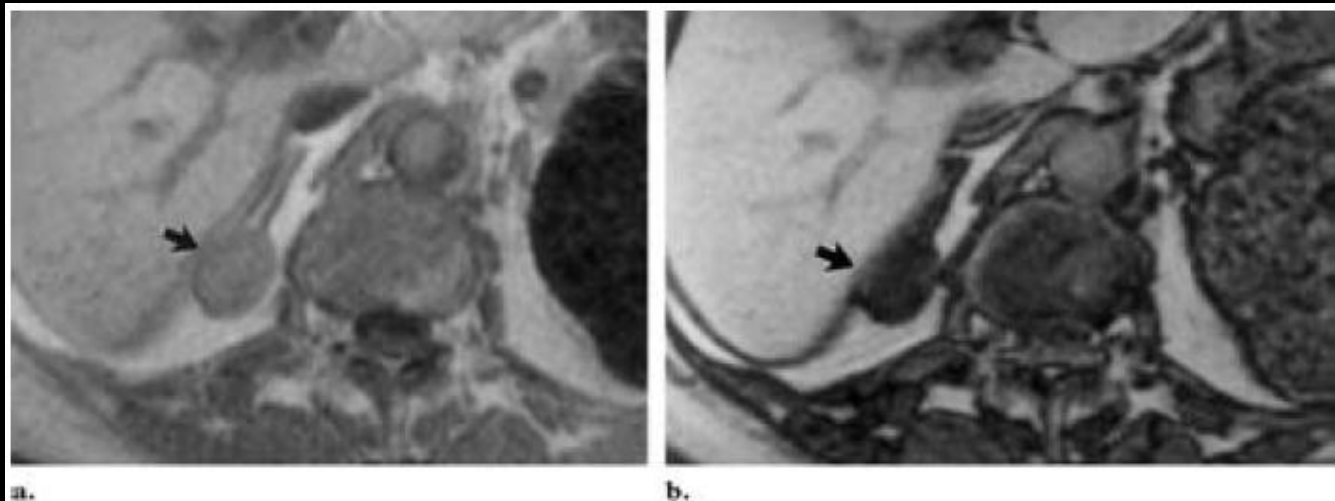


Figure 15. Indeterminate right adrenal mass found at CT in a 45-year-old woman with breast cancer. (a) T1-weighted in-phase MR image demonstrates a right adrenal mass (arrow). (b) T1-weighted out-of-phase MR image shows signal drop-off in the adrenal gland (arrow), which is diagnostic of an adenoma.

- *Radiographics: State of the Art Adrenal Imaging*

- **Patients with sickle cell trait are increased risk for which of the following renal tumors?**
 - a. Medullary carcinoma
 - b. Angiomyolipoma
 - c. Transitional cell carcinoma
 - d. Oncocytoma
 - e. Renal cell carcinoma

A. Medullary carcinoma

- Medullary carcinoma is an infiltrating neoplasm of the kidney highly associated with sickle cell trait and less commonly sickle cell anemia (“seventh sickle cell nephropathy”). It appears to originate from elements of the kidney originally derived from the ureteric bud. Clinically, they are found in pts aged less than 40 years. They are indistinguishable radiographically from other infiltrating neoplasms of the kidney. They tend to be centrally located. Highly aggressive--mean survival 15 weeks from diagnosis.
- Angiomyolipoma is associated with tuberous sclerosis.
- RCC is the most common primary renal malignancy.
- Oncocytoma is a benign neoplasm. *Genitourinary Requisites, 115, 81-120; Dähnert 5th p. 926*

- **Which of the following is not associated with papillary necrosis?**
 - a. oxalosis
 - b. diabetes mellitus
 - c. NSAIDS
 - d. TB
 - e. renal vein thrombosis

A. Oxalosis

- Oxalosis is not associated with papillary necrosis; rather, it is associated with medullary and cortical nephrocalcinosis. Dahnert 5th 884.
- Mnemonic for causes of papillary necrosis:
POSTCARD
Pyelonephritis, Obstruction (chronic), Sick cell disease, TB / Trauma, Cirrhosis (ethanol) / Coagulopathy, Analgesics (phenacetin), Renal vein thrombosis, Diabetes (50%)
*Primer 3rd, 352; **Dahnert 5th 934-935***

- During an IVP a patient becomes bradycardic and hypotensive. Which of the following is NOT an appropriate therapy?
 - a. atropine
 - b. iv fluids
 - c. epinephrine
 - d. Trendelenburg position
 - e. oxygen

C. Epinephrine

- A patient with hypotension (SBP < 90) and bradycardia (HR<60) is experiencing a VASOVAGAL reaction. According to the ACR manual on contrast reactions, the following should be done for hypotension with bradycardia:
 1. monitor vital signs
 2. Trendelenburg position or elevate legs more than 60 degrees
 3. secure airway (ABCs): give oxygen 6-10L/m by mask
 4. secure IV access: rapid fluid replacement with NS
 5. Atropine 0.5-1.0mg IV slowly
 6. repeat atropine up to total dose of 2-3mgSo strictly speaking, the first thing you should do is E-put the person in trendelenburg (although you can't really "give" trendelenburg). I think C (give the person IV fluids) is a good choice depending on the patient's degree of hypotension. Atropine is a choice further along if the patient continues to have hypotension despite the conservative measures (trendelenburg and fluids). Epinephrine is used in patients with hypotension with tachycardia (shock). Epinephrine stimulates adrenergic receptors, producing vasoconstriction, increasing blood pressure and heart rate; Atropine works by blocking vagal nerve discharges and thus increases heart rate.
ACLS Provider Manual, copyright 2001, pgs 82, 105, 145-156 and *Primer*, 647
- ***Dahnert 5th, front and back covers***

- **A renal mass with Hounsfield Units of 60 is seen on CT with IV contrast. What is the most appropriate management?**
 - a. percutaneous biopsy
 - b. partial nephrectomy
 - c. CT without contrast
 - d. Follow up CT in 6 months

C. CT without contrast

- Normal attenuation of renal parenchyma is 30-60 HU on noncontrasted scans. Postcontrast, parenchyma HU will increase to 80-120 HU. Recommended protocol to evaluate renal masses include noncontrasted as well as contrasted images. You must be able to compare the mass to the kidney on noncontrasted images and to see if its attenuation changes after contrast administration. Also, there may be a calcification component obscured by the contrasted renal parenchyma. ***Genitourinary Requisites 25-26, 47***

- **A young male has an ultrasound examination that shows no kidney in the right renal fossa and a cyst between the bladder and prostate. Most likely diagnosis:**
 - a. pelvic kidney
 - b. renal agenesis
 - c. crossed ectopia
 - d.

B. renal agenesis

- Renal agenesis is associated with ureteral abnormalities such as absence of the ipsilateral ureter or remnant of the ureter. 20% of cases associated with absence of ipsilateral epididymis, vas deferens, or seminal vesicle, or presence of an associated ipsilateral seminal vesicle cyst. The cyst in this question is likely a seminal vesicle cyst. Pelvic kidney and crossed ectopia do not have this association.

Genitourinary Requisites, pgs 53, 327-328, 330 *Primer*, 324

- Congenital seminal vesicle cyst associations:
 - Ectopic ureteral insertion, ipsilateral renal dysgenesis, duplicated collecting system, agenesis of vas deferens
 - ***Dahnert 5th 965***

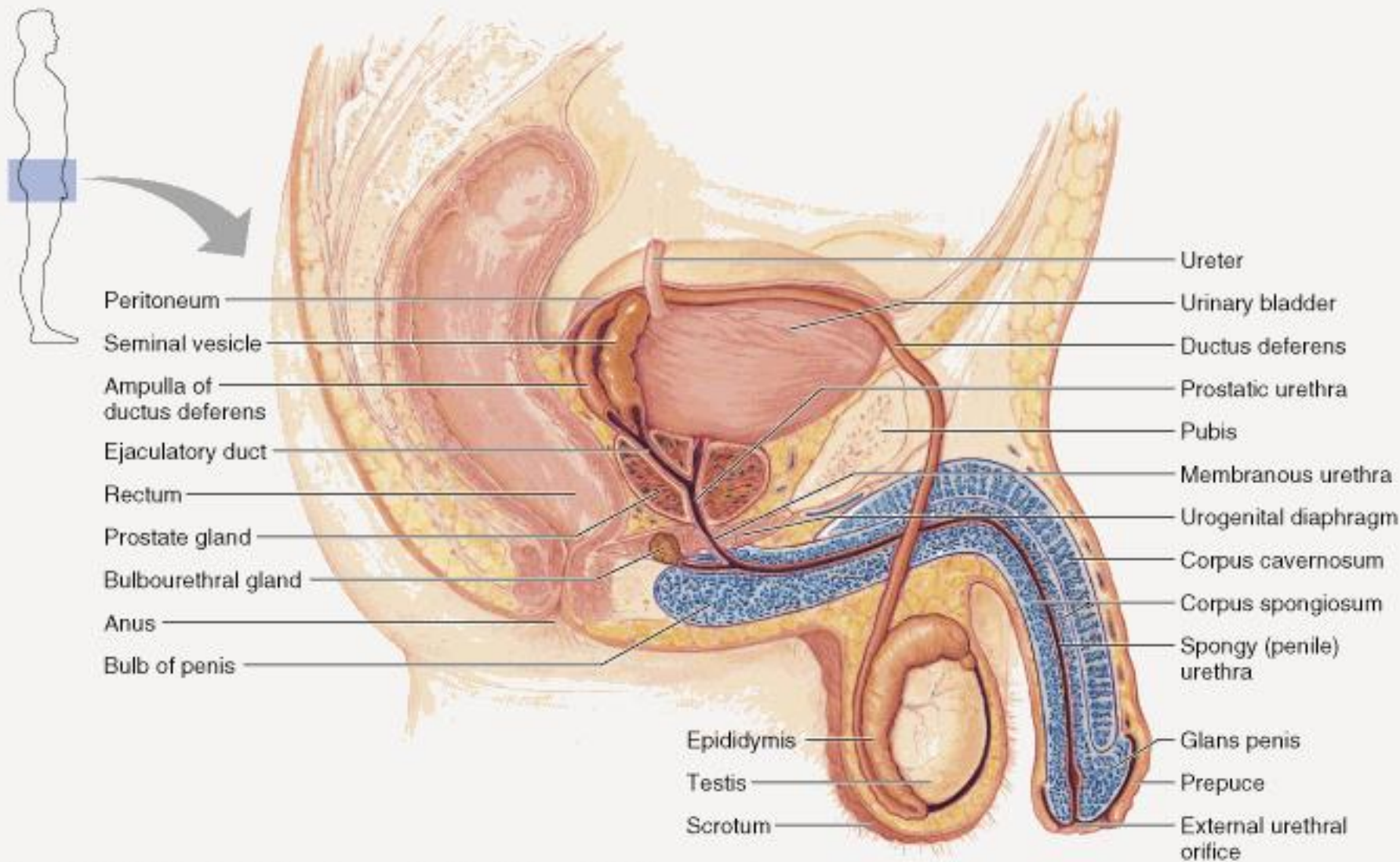
- **At what level are Cowper's glands located?**
 - a. prostatic urethra
 - b. membranous urethra
 - c. bulbous urethra
 - d. penile urethra
- Other recalls ask where the ducts are located and this is posterior to the bulbous urethra

B. membranous urethra

- The accessory sex glands of Cowper are a pair of structures located one on each side of the membranous urethra between the two fascial layers of the urogenital diaphragm. The paired ducts of these glands are 2-3 cm in length and extend forward and medially to enter the proximal bulbous urethra. They are ontogenically homologous to Bartholin's glands in females.

Genitourinary Requisites, 195

– ***Dahnert 5th 905***



- **Which of the following is most likely to be unilateral?**
 - a. multicystic dysplastic kidney
 - b. autosomal recessive kidney disease
 - c. autosomal dominant kidney disease
 - d. medullary cystic kidney disease

A. Multicystic dysplastic kidney

- Multicystic dysplastic kidney usually presents unilaterally because bilateral MDK is incompatible with life. The autosomal kidney diseases and medullary cystic kidney disease are bilateral.

Genitourinary Requisites 66-69, 108-109, 130-131

- ***Dahnert 5th 928-929***

- **A man has microscopic hematuria. Which of the following is the best study to evaluate for bladder cancer?**
 - a. Cystoscopy
 - b. Retrograde cystogram
 - c. MRI
 - d. CT
 - e. US

Cystoscopy

- **Which of the following is most likely to cause air in the bladder wall?**
 - a. Candida
 - b. trauma
 - c. e coli
 - d.

C. E. coli

- Emphysematous cystitis caused by infection (most commonly E. coli, but others as well including Candida). Nearly pathognomonic of poorly controlled DM. Predisposing diseases: diabetes mellitus (most common), long-standing urinary tract obstruction. Radiographic features: gas in bladder wall, gas may enter the ureter, air-fluid level in bladder.
- *Primer 305, Dahnert 5th 916-917*
- Trauma may result in air in the bladder lumen, but probably not within the bladder wall.

- **Which of the following is false about bladder diverticula?**
 - a. Schistosomiasis is a cause
 - b. Can be congenital
 - c. Associated with stone formation
 - d. can occur in bladder obstruction

A. Schistosomiasis is a cause

- Types of bladder diverticulum: Hutch diverticulum—congenital weakness of musculature near UVJ, usually associated with reflux. Acquired diverticulum in bladder outlet obstruction—usually multiple, not associated with reflux, complications of: infection, calculi (25%), tumor (3%)
- Schistosomiasis: Infected humans excrete eggs in urinary tract which become trapped in mucosa and cause granulomatous reaction. Radiographic findings: extensive calcification in bladder wall (hallmark), inflammatory pseudopolyps, ureteral strictures and/or fistulas, SCC. *Genitourinary Requisites* 305, 306; ***Dahnert 5th 913-914***
- Bladder involvement with schistosomiasis includes:
 - Bladder wall calcifications, calculi, polypoid filling defects with mucosal irregularity, thick-walled fibrotic bladder, reduced capacity with large PVR (fibrotic stage), squamous cell carcinoma
 - ***Dahnert 5th 964-965***

- **Where is the most common location for urethral obstruction in young boys?**
 - a. Prostatic urethra
 - b. Membranous urethra
 - c. Bulbous urethra
 - d. Penile urethra

A. Prostatic urethra

- Posterior urethral valves occur in 1:5,000 to 8,000 boys; they are the most common cause of urinary tract obstruction + leading cause of end-stage renal disease among boys. They are congenital folds located in the posterior urethra near the distal end of the verumontanum; the verumontanum is located within the prostatic urethra. Causes of bladder outlet obstruction in children: posterior urethral valves (most common in males), ectopic ureterocele (most common in females), bladder neck obstruction, urethral stricture, prune belly syndrome.
Genitourinary Requisites, 194-195 and *Primer* 308, 834-835
- ***Dahnert 5th 938-939***

- **A man presents with dysuria, stricture of the penile urethra and dilated glands (of Littré) on retrograde urethro gram. What is the most likely cause of the stricture?**
 - a. prior gonococcal infection
 - b. prior instrumentation
 - c. neoplasm
 - d. pelvic ring fracture

A. prior gonococcal infection

- Infection with *Neisseria gonorrhoeae* begins in the mucosa and periurethral glands of Littre. Symptoms of dysuria and urethral discharge occur. Can result in urethral stricture and opacified (dilated) glands of Littre on urethrography due to inflammatory dilatation of duct ostia.
- 40% of urethral strictures are infectious in etiology.
- The proximal bulbar urethra is the site of stricture in 70% of patients with gonococcal urethritis because of the high concentration of periurethral glands in this area and the dependent position of this portion of the male urethra.

Genitourinary Requisites, 235-236



- **A female with prior GYN surgery has an IVP that shows a smooth defect in the bladder pulled up and pointing to the right sacroiliac joint. Most likely cause:**
 - a. cystitis
 - b. adhesions
 - c. pelvic lipomatosis
 - d. psoas “hitch” procedure

D. iliopsoas “hitch” procedure

- Iliopsoas hitch, in conjunction with ureteroneocystostomy, is a surgical repair of a distal ureteral stricture. It is described as follows: “If a tension-free anastomosis cannot be accomplished by a simple ureteroneocystostomy, a vesicopsoas hitch can be performed. This technique can be used to bridge a 6- to 8-cm defect and is successful in 95% of adults and children. This procedure involves mobilizing the bladder and pulling it superiorly and laterally by fixing it to the psoas tendon with absorbable suture”. This appears to be the best answer to this question.
- Pelvic lipomatosis is an abnormal amount of pelvic fat that compresses normal structures. It causes elongation and narrowing of the urinary bladder and of the rectosigmoid.
- Cystitis would give thicken the mucosa of the bladder giving a cobblestone appearance, and could reduce bladder capacity.
- Adhesions could result in focal narrowing of the bladder or ureters. Adhesions tether the organs and would unlikely move the bladder this far laterally.
- Ureteral Stricture by Kane, MD, off of *www.ask.com* and *Primer* 305,314 and *Genitourinary Requisites* 263



- **A renal mass is seen on non-contrasted CT that is iso-attenuated to normal renal parenchyma, which is displaying a dual collecting system. The lesion has enhancement similar to normal parenchyma with intravenous contrast. Most likely diagnosis:**
 - a. renal cell carcinoma
 - b. transitional cell carcinoma
 - c. normal tissue
 - d. oncocytoma

C. Normal tissue

- Renal cell carcinoma are isointense to renal parenchyma on noncontrasted CT but are hypodense compared to kidney after contrast administration. They are typically lobulated with irregular margins with inhomogeneous internal density. Calcification frequently occurs.
- Transitional cell carcinoma is a urothelial neoplasm that originates (in the kidney) in the intrarenal collecting system and then (25%) can spread into the kidney parenchyma. When invading the parenchyma they universally spread by infiltration. They are hypodense to renal parenchyma postcontrast.
- A duplicated collecting system will have normal parenchyma between the two collecting systems.
- Oncocytoma has similar imaging characteristics with RCC. Look for a central scar on CT or MR or a “spoke wheel” appearance on angiography. *Genitourinary Requisites*, 89-101, 113-114
- Renal “pseudotumor” – Dahnert 5th 878

- **Which of the following is not a germ cell tumor?**
 - a. Choriocarcinoma
 - b. Seminoma
 - c. Leydig cell tumor
 - d. Teratoma

C. Leydig cell tumor

- Leydig cell tumors are interstitial cell tumors, which also include sertoli cell tumors and gonadoblastomas.
- Germ cell tumors: YES CT
 - Yolk sac tumor
 - Embryonal cell carcinoma
 - Seminoma
 - Choriocarcinoma
 - Teratoma
- ***Dahnert 5th 967-970***

- **Which of the following is true regarding the uterus and adenomyosis?**
 - a. easily differentiated from leiomyomas
 - b. more common in nulliparous females
 - c. premalignant
 - d. adenomyosis is decreased signal on T2
 - e. endometrial thickness is best measured in the coronal plane
 - f. endometrium is typically hypoechoic

D. adenomyosis is decreased signal on T2

- Adenomyosis has primarily low signal on **all** sequences. It may also have sparse, small, high-intensity foci within it on T1 and T2 images which represent hemorrhage in endometrial islands.
- Leiomyomas are in the differential for adenomyosis; it is typically found in multiparous women over 30 yrs; it is a benign process, with no malignant association.
- Measuring endometrial thickness should be performed in the sagittal plane.
- The endometrium is typically hyperechoic
Dähnert 5th p. 1022.; Genitourinary Requisites 16-20, 258-261.

- **Which gives intrarenal low resistive index?**
 - a. hydronephrosis
 - b. ATN
 - c. pyelonephritis
 - d. renal artery stenosis

D. renal artery stenosis

- $RI = (\text{Peak systolic velocity} - \text{peak diastolic velocity}) / \text{peak systolic velocity}$
- Normally, intrarenal arterial waveforms show an extremely rapid early systolic acceleration that is reflected by an almost vertical upstroke.
- Renal artery stenosis of the main renal artery produces a slowed systolic upstroke and a delayed time to peak systole. This dampening of the distal arterial waveforms has been referred to as the *parvus-tardus* effect. (compare images in Ultrasound Requisites, fig 4-78b and fig 4-77, renal artery stenosis vs normal, pgs 111-112).. With diminished systolic waveform and little to no change in diastolic waveform, the RI will be lower in renal artery stenosis. *Ultrasound Requisites pg 111-112; Dahnert 5th 948-949*
- The resistive index in RAS is usually less than 0.56
 - Emedicine; Renovascular HTN

- **What is the most likely cause of intermenstrual bleeding?**
 - a. adenomyosis
 - b. endometrial polyp
 - c. endometrial cancer
 - d. cervical cancer
 - e. Ovulation
- **Which of the following is the Least likely cause of intermenstrual bleeding.**
 - A. adenomyosis
 - B. ovulation
 - C. endometrial carcinoma
 - D. endometrial polyp

- **B. endometrial polyp**
- As per above (first paragraph), the most common cause of bleeding between menstrual cycles is endometrial hyperplasia or endometrial polyps.
Primer, 362
- answer B. Ovulation
 - Adenomyosis, endometrial carcinoma, and endometrial polyps all cause intermenstrual bleeding.
 - Ref. Danhert

- **An ovarian follicle is likely to rupture after it has obtained which diameter?**
 - a. 10 mm
 - b. 20 mm
 - c. 30 mm
 - d. 40 mm
 - e. 50 mm

B. 20 mm

- Ovarian follicles are functional cysts and thus are rarely greater than 25 mm in diameter. Such cysts will tend to be large when they rupture, and is thus likely in the 20-25 mm range
Primer, 339 and Genitourinary Requisites, pg 273-274
- Normally, the ovaries contain several follicles less than 5mm in diameter. During follicular phase of cycle, one follicle is recruited by an unknown mechanism and grows in response to FSH. This follicle grows 2mm/day until midcycle where it ruptures at an avg. diameter of 20mm. Assisted reproductive meds (Clomiphene) may cause follicles to become larger at time of rupture (22mm). Callen, *Ultrasonography in OB and GYN*, 907-908.

- **Following transplant, reversed flow in the renal artery during diastole is most likely due to:**
 - a. ATN
 - b. renal artery stenosis
 - c. renal vein thrombosis
 - d. acute rejection
 - e. urinary obstruction

- Following transplant, reversed flow in the renal artery during diastole is most likely due to:
 - a. ATN
 - b. renal artery stenosis
 - c. renal vein thrombosis
 - d. acute rejection
 - e. urinary obstruction

Renal vein thrombosis

- Renal vein thrombosis can cause reversal of flow in the renal artery during diastole due to hemodynamic pressure from the congested kidney. Renal artery stenosis will have diminished flow but not reversed flow. ATN is the only renal process with normal renal flow but reduced excretion. Acute rejection has both reduced blood flow and reduced excretion. Urinary obstruction can lead to diminished perfusion but not reversal of flow.
- Approx. 50% of pts experience an episode of acute rejection in the first year. Reversal of diastolic flow may be seen.
- Renal vein thrombosis and stenosis is rare (0% to 4%) and usually occurs in the post-operative period. Duplex and color Doppler reveal absent renal venous flow with reversed diastolic arterial flow.
 - *Dahnert 5th 955-958*
 - *Radiographics. 2000;20:607-622.*

Graft Thrombosis

- Graft thrombosis, either arterial or venous, is a rare complication, with a reported prevalence of 0.5%–6.2%
- however, it is a major cause of graft loss in the early (<1 week) posttransplantation period.
- Renal artery thrombosis usually stems from the surgical technique and results from
 - torsion,
 - kinking, or
 - angulation of the anastomosis or
 - dissection of the arterial wall.
- Endovascular techniques with stent placement may prevent thrombosis in such patients
- External compression by a hematoma or lymphocele or propagation of a deep venous thrombosis from the iliofemoral vein may lead to a renal vein thrombosis.
- Other causes include a hypercoagulable state and acute rejection

Digital subtraction angiogram of the right external iliac artery (ipsilateral femoral approach) shows dissection of the renal artery, a potential precursor to thrombosis



Graft Thrombosis

- Renal Artery Thrombosis,
 - flow in both main and intrarenal arteries is completely absent at color Doppler flow US
 - Radionuclide imaging shows absent perfusion, as indicated by a photopenic image at the allograft site
- Renal Vein Thrombosis,
 - color Doppler flow US shows completely absent venous flow and
 - an abnormal arterial signal with a plateau-like reversed diastolic flow
 - Radionuclide imaging does not show a photopenic image, although it may show a lack of allograft perfusion
- Catheter-based angiography, MR angiography, or MR venography may be performed to help confirm these findings
- Graft loss is inevitable if the diagnosis of graft thrombosis is delayed.
- In patients with renal vein thrombosis, thromboembolic and septic complications or graft rupture resulting from the high venous pressure may cause death.
- TX
 - surgical thrombectomy with arterial or venous repair is usually performed;
 - however, nephrectomy is necessary in most cases.
 - Although several successful cases of catheter-directed thrombolysis with or without percutaneous angioplasty or stent placement have been reported, the role of interventional management in graft thrombosis is not clearly defined
 - Catheter-directed thrombolytic therapy is not recommended during the first 10-14 days after transplantation because of the risk of vascular suture line leakage secondary to immature anastomosis

Renal Vein Thrombosis

- **A post-menopausal women has 3.5 cm ovarian cyst with single thin septation. What is the appropriate management?**
 - a. surgical excision
 - b. 3 month US follow-up
 - c. laproscopy
 - d. CT scan
 - e. do nothing

- A post-menopausal women has 3.5 cm ovarian cyst with single thin septation. What is the appropriate management?
 - a. surgical excision
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 - c. laproscopy
 - d. CT scan
 - e. do nothing

surgical excision

- Postmenopausal cysts:
 - If septated or >3cm, check CA-125 and remove
- Dahnert 5th 1049
- This answer depends on what source you read.
- Three sources below – general concenses would be to take this out.
- Any complex cyst in a post-menopausal (PM) pt OR simple cyst >5cm, consider surgery. In PM patients, ignore simple cysts measuring <1.6cm. Simple cysts measuring 1.6 – 5.0cm, F/U US in 4 mo. (Wagner – AFIP).
- A septated cyst in a postmenopausal patient >3cm → surgical exploration (Mass Gen p838)
- Simple cyst in PM patient less than or equal to 5cm → F/U, if greater than 5cm, consider surgical removal or close F/U.
- Any complex cyst, including septations or solid nodules, surgery is recommended (Rumack p546)

GU Part 3

2008-1997

2001

- **Varicocele arises from:**
 - a. Pampiniform plexus
 - b. More common on right side
 - c. Occur with normal valves in spermatic vein

A. Pampiniform plexus.

- Varicoceles represent dilated veins of the pampiniform plexus. Result from incompetent or absent valves in the spermatic vein. Prevalence: 15%. Clinical Findings: Infertility, pain, scrotal enlargement. Location: 90% occur on the left side (due to drainage of the left spermatic vein into the left renal vein at a right angle). 25% of Varicoceles are bilateral. On US: hypoechoic veins (“bag of worms”), veins easily compressed by transducer, increase in venous size when patient is upright or valsalvas.

Primer 3rd ed., pg 327. Dähnert 5th p. 982.

- **A thrombosed ovarian vein in the post purpeural stage may appear as all of the following *except*?**
 - a. absent ultrasound flow
 - b. A mass at the junction of the right renal vein and the ovarian vein
 - c. soft tissue density anterior to the right psoas
 - d. echolucent linear structure
- In ovarian vein thrombosis, associated findings include all EXCEPT:
 - tubular anechoic structure
 - indistinct mass or inflammatory changes lateral to the ureter and anterior to psoas
 - thrombus extending into the right renal vein
 - thrombus extending into the IVC
 - no dopplerable flow in ovarian vein

- B. A mass at the junction of the right renal vein and the ovarian vein
- thrombus extending into the right renal vein
- This choice is definitely *false*, because the right ovarian vein drains directly into the IVC. However, the thrombus commonly affects the most cephalic portion of the right ovarian vein and can usually be demonstrated sonographically at the junction of the right ovarian vein with the inferior vena cava, sometimes extending into the inferior vena cava. *Rumack 2nd p. 567*. Other facts about ovarian vein thrombophlebitis:
 - *right* ovarian vein is involved in 80-90% of cases (retrograde through left ovarian vein in the puerperium protects this side)
 - sonography may demonstrate an inflammatory mass lateral to the uterus and anterior to the psoas
 - Doppler imaging may demonstrate absence of flow in these veins
 - ovarian vein may appear as a tubular, anechoic structure containing echogenic thrombus. Incidence 1:600-1:2,000 deliveries; usually presents on 2nd or 3rd postpartum day; palpable mass in ~50%; mortality of 5% reported. ***Dähnert 5th p. 1050***

- **Which does not cause bladder wall calcifications?**
 - a. TB
 - b. Schistosomiasis
 - c. Malacoplakia
 - d. Transitional cell carcinoma
 - e. Cystitis

C. Malacoplakia.

- Malacoplakia [Greek = soft plaque] is a granulomatous inflammatory process that affects the urinary bladder and lower ureter, in response to a gram negative infection [94% *E. coli*]. It causes multiple raised but sessile filling defects on cystography. Rare (< 200 cases reported)
 - CT shows low attenuation lesions
 - ***Dähnert 5th p. 924.***
- Mnemonic: **SCRITT** Schistosomiasis, Cytotoxin, Radiation, Interstitial cystitis, TB, TCC
- *Primer, pg 357 and GU Requisites 208-209; Dähnert 5th p. 889*

- **Which zone of the prostate is removed in TURP?**
 - a. transitional region
 - b. peripheral zone
 - c. central zone

A. transitional zone.

- In transurethral resection of the prostate the innermost portion of the prostate, around the urethra, is removed. The glandular tissue of the prostate is divided into three zones. The large peripheral zone is located posteriorly from the base of the verumontanum to the apex of the prostate gland. The central zone is found around the ejaculatory ducts. The transitional zone surrounds the prostatic urethra. ***Genitourinary Requisites, pg 307***

- A male presents with multiple strictures in the urethra on urethrogram. The most likely cause is :
 - Prostatitis
 - Gonococcal infection
 - Previous instrumentation

Previous instrumentation

- This was reviewed by Brent Wagner, MD at the AFIP as a 'written boards question.' Since the advent of antibiotic therapy for sexually transmitted diseases, iatrogenic or post-instrumentation of the male urethra is the most common etiology for stricture formation. The two classic locations for strictures post instrumentation are at the penoscrotal junction and the confluence of the bulbomembranous urethra. The most common instrument to cause urethral damage is the rigid rectoscope used in TURP procedures (incidence as high as 14%). Also remember that Gonococcus is responsible for approximately 40% of urethral strictures in the U.S. (Dunnick, 414-21, AFIP (Wagner, B) p. 470, God – personal communication)

- **Salpingitis isthmica nodosa (SIN) is associated with:**
 - a. Hydrosalpinx
 - b. Endometriosis
 - c. Adenomyosis
 - d. Congenital uterine abnormalities
 - e. uterine hyperplasia

A. Hydrosalpinx

- The aetiology of this entity is unknown but it is probably due to a noninflammatory process similar to adenomyosis or related to diverticulosis in other organs^[74]. Infection may be a secondary process. HSG shows multiple small diverticula of the Fallopian tubes. The diverticula are up to 2 mm in diameter and are usually situated on a 10 × 20 mm long segment of the proximal portions of the Fallopian tubes (Fig. 94A.32). Often both Fallopian tubes are involved and obstructed in many cases. Inflammatory changes are often found on pathological examination.
 - Grainger & Allison's Diagnostic Radiology: A Textbook of Medical Imaging, 4th Ed., p. 2217 (MD Consult)
- ***Dähnert 5th p. 1052***

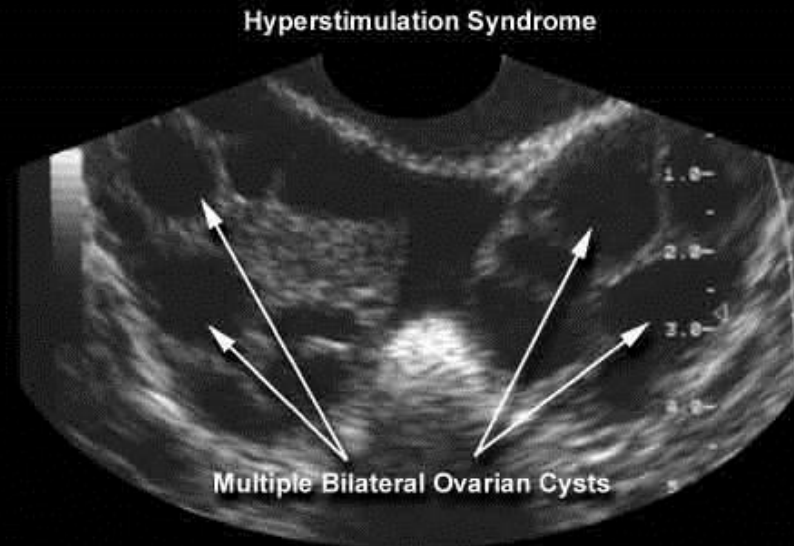


Radiograph of SIN involving entirety of the right tube. Large round diverticula (arrows) are uncommon in our experience, but have been reported previously.

- **Patient on hormonal therapy with multiple ovarian cystic lesions:**
 - a. Polycystic Ovary Disease
 - b. ovarian hyperstimulation syndrome
 - c.
 - d.

B. ovarian overstimulation syndrome

- Ovarian hyperstimulation: ovaries enlarge and contain multiple large lutein cysts. *Dähnert 5th p. 1050* PCOD also has enlarged ovaries with multiple cysts. However, it has a classic clinical presentation: oligoamenorrhea, infertility, and hirsutism. *Primer, 348. Genitourinary Requisites, pg 273-275 Dähnert 5th 1050*

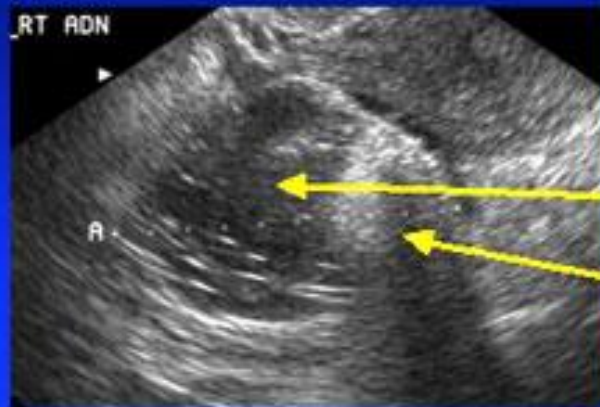


- Ultrasound of a mature cystic teratoma of the ovary will characteristically show what feature that is usually NOT seen in other ovarian tumors?
 - a. Focus of intense echogenicity
 - b. Low level internal echoes in cyst
 - c. Vascular flow around the cyst
 - d. Septations within the cyst

Focus of intense echogenicity

- First, remember that a mature cystic teratoma is also called an ovarian dermoid. Choice A is describing one of the three specific ultrasound presentations of a dermoid, the “dermoid plug”. This is cystic mass with an echogenic mural nodule. The plug contains teeth, hair and sebum and it frequently casts an acoustic shadow. The other two signs are the “tip of the iceberg” - a highly echogenic mixture of matted hair and sebum that casts a shadow obscuring the posterior aspect of the mass and finally the “dermoid mesh” - multiple linear hyperechoic interfaces floating within a cyst. Choice B is the opposite of the dermoid mesh; C is not related and D describes many other masses in the ovary like mucinous and serous tumors. Rumack 558.

Bilateral ovarian dermoids with typical features



Cystic with linear strands

Solid echogenic mass

Predominantly cystic



- **Postmenopausal endometrial bleeding**
 - a. endometrial polyps
 - b. endometrial hyperplasia
 - c. endometrial carcinoma
 - d. endometrial atrophy

D. endometrial atrophy.

- Endometrial atrophy causes postmenopausal bleeding in 60-75% of cases:
 - thin atrophic endometrium is prone to ulceration
 - In the 75% with endometrial thickness < 4-5 mm, no biopsy needed
 - in 25% endometrium 6-15 mm
- Other causes of postmenopausal uterine bleeding: endometrial hyperplasia, polyp, submucosal fibroid, adenomyoma, endometrial carcinoma (7-20%), estrogen withdrawal.
- Dähnert 5th p. 1004. Primer, 362 and Genitourinary Requisites, 250, 289-291 and 295-300***

- **Female with mass at the base of the bladder and post-void dribbling,**
 - a. ectopic insertion of the ureter
 - b. ureterocele
 - c. urethral diverticulum
 - d. ureteral diverticulum

C. Urethral diverticulum.

- Urethral diverticulum (6x more common in black women). Can be acquired or congenital. Congenital ones occur in males and are second to posterior urethral valves as the most common cause of urethral obstruction in male infants. Acquired ones (aka pseudodiverticulum) present in adults, often due to infection and abscess formation in female paraurethral glands which decompress into the urethra. These, if large enough, can elevate the base of the bladder (the “female prostate” sign). They predispose to infection and stone formation. Frequency, dysuria, dyspareunia, and postvoid dribbling are common symptoms.
 - *Dähnert 5th p. 979, GU Reqs 244-245.*
- Ectopic Insertion of a ureter, in a female, often inserts into the bladder neck, the urethra, or into the vagina. In male patients the ureter never inserts inferior to the external sphincter (so there is less infection and incontinence rarely a problem). Extravesical insertion of the ureter in a female is associated with chronic incontinence with the classic triad of: continuous urine leakage, normal voiding, some degree of renal impairment.
- Ectopic ureteroceles are usually associated with the ureter draining the upper pole of a duplicated collecting system. As per the Weigert-Meyer rule, it inserts medially and inferiorly to the normal ureteral insertion point. It may cause obstruction of the opposite ureter.
- Ureteral diverticulum, which most likely develops from a duplicated ureteric, is a blind-ending segment of ureter connected to the otherwise normal ureter. It is usually of little clinical significance but can be a reservoir of static urine predisposing to infection or stone development. *Genitourinary Requisites, 156-158, 160, 244-245 and Radiology: Diagnosis-Imaging-Intervention (by Taveras, et al) (4) 133:3-4*

- **Which of the following is false concerning varicoceles?**
 - a. is seen in 10-20% of males
 - b. mostly asymptomatic
 - c. more common on the right side
 - d. associated with infertility

C. more common on the right side. (False)

- 78-90% occur on the left side (due to drainage of the left spermatic vein into the left renal vein at a right angle). Varicoceles represent dilated veins of the pampiniform plexus. They result from incompetent or absent valves in the spermatic vein. Prevalence: 15% of adult males. If symptomatic, the clinical findings generally are: Infertility, pain, scrotal enlargement. 25% of Varicoceles are bilateral. On US: hypoechoic veins (“bag of worms”), veins easily compressed by transducer, increase in venous size when patient is upright or valsalvas.

*Primer of Diagnostic Imaging, 3rd ed., pg 327. **Dähnert 5th p. 982-983.***

- Which is *false* regarding the ovaries in postmenopausal women--
 - a. the majority of cysts are less than 3 cm
 - b. simple cysts are seen in up to 50%
 - c. if you see a mural nodule, radiologic workup is warranted
 - d. cysts are often associated with hormonal replacement therapy (HRT)

B. simple cysts are seen in up to 50%. (False)

- Ovarian cysts occur in 50% of females with irregular menses, 30% of females with regular menses, and 6% of postmenopausal women
 - emedicine
- Asymptomatic simple adnexal cysts may be seen in **20-30%** of postmenopausal women. A typical post-menopausal ovarian cyst measures 3.0-3.5 cm. A cyst with a **mural nodule** is complex (18% malignant), and warrants further workup.
 - in particular, a cyst with a mural nodule in a peri-/post-menopausal woman raises the suspicion for clear cell carcinoma of the ovary ***Dähnert 5th p. 1026.***
- Although the exact relationship between HRT and postmenopausal ovarian cysts is unclear, it has been noted that up to 40% of women on HRT have ovarian cysts (vs. only 20-30% of post-menopausal women w/o HRT). Ovaries atrophy after menopause and by age 70 are no greater than 1 cc in volume. Most cysts are less than 3.0 cm in greatest dimension. Most simple cysts in postmenopausal ovaries <5cm are not likely malignant. ***Genitourinary Requisites 253, 275-276 and Ultrasound Requisites 393-394***

- **Renal nephroblastomatosis – which is the best way to evaluate it?**
 - a. Computed Tomography
 - b. US
 - c. IVP
 - d. Radiography

A. Computed Tomography.

- Contrast-enhanced CT is the preferred study to evaluate renal nephroblastomatosis, as the peripheral low-attenuated nodules show less enhancement than the renal parenchyma.
- ***Dähnert 5th p. 931.***
- Nephrogenic rests are foci of metanephric blastema that persist beyond 36 weeks gestation and have the potential for malignant transformation into Wilms' tumor. Multiple solid, subcapsular mass lesions are virtually diagnostic. By MRI the nodules demonstrate low-signal-intensity foci on both T1W and T2W images. They are hypoechoic by US. *Primer 840*
- Children with Beckwith-Wiedemann, Trisomy18, hemihypertrophy and Perlman syndrome more commonly have perilobar nephrogenic rests. Children with sporadic aniridia, DRASH syndrome, and WAGR syndrome more commonly have intralobar nephrogenic rests. Perilobar nephrogenic rests are associated with synchronous bilateral tumors. Intralobar nephrogenic rests are associated with metachronous bilateral tumors. Intralobar rests are less common but have a higher association with Wilms tumor development.
- Most commonly seen as hypoechoic nodules on US(may also be hyperechoic or isoechoic). Contrast enhanced CT is more sensitive than US. It appears as low attenuation renal lesions. MRI may detect nephrogenic rests as small as 4mm and can distinguish nephrogenic rests from Wilms tumors. They are low signal intensity on both T1 and T2 weighted imaging.

Nephroblastomatosis

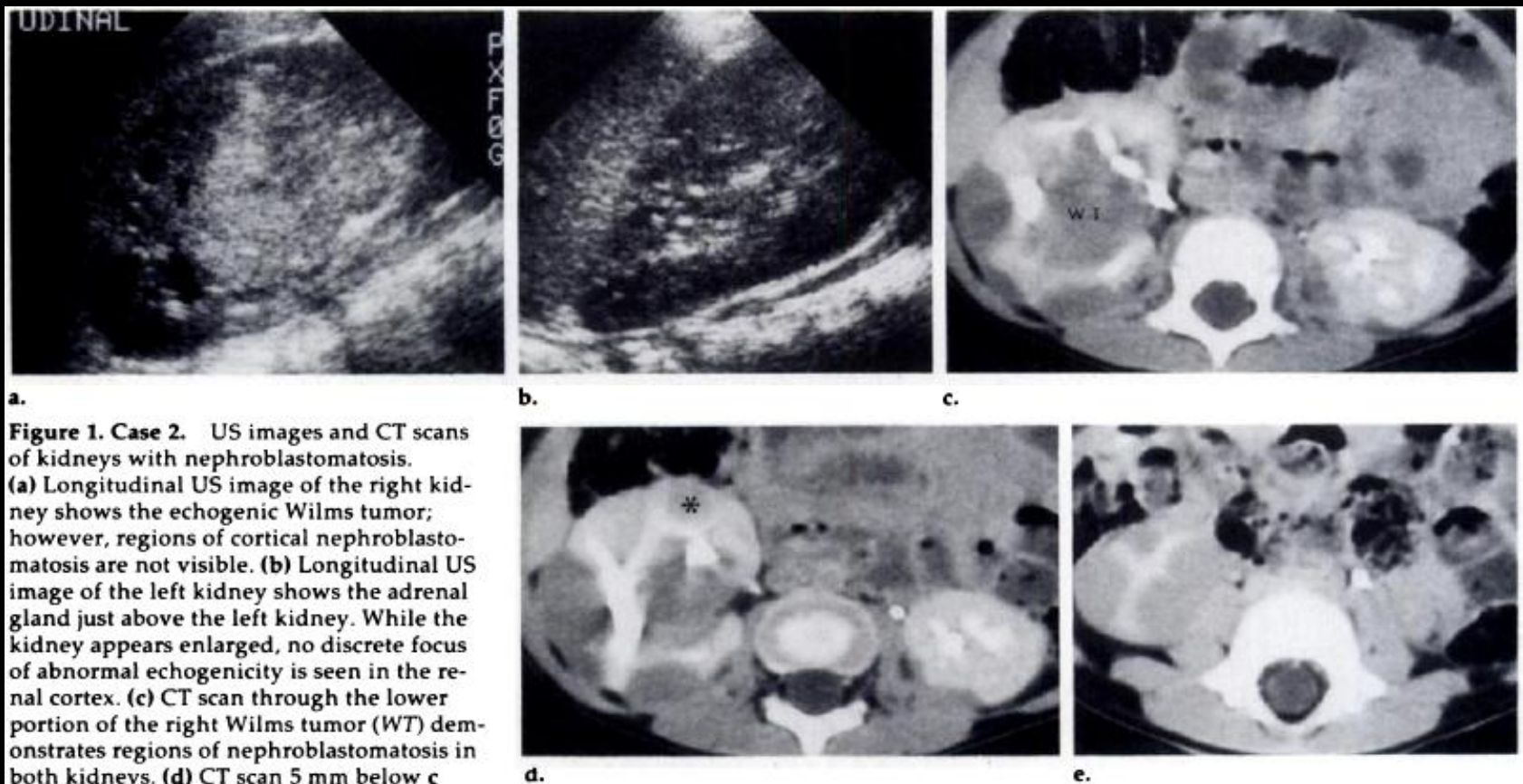


Figure 1. Case 2. US images and CT scans of kidneys with nephroblastomatosis. (a) Longitudinal US image of the right kidney shows the echogenic Wilms tumor; however, regions of cortical nephroblastomatosis are not visible. (b) Longitudinal US image of the left kidney shows the adrenal gland just above the left kidney. While the kidney appears enlarged, no discrete focus of abnormal echogenicity is seen in the renal cortex. (c) CT scan through the lower portion of the right Wilms tumor (WT) demonstrates regions of nephroblastomatosis in both kidneys. (d) CT scan 5 mm below c shows an additional region of nephroblastomatosis along the anterior aspect of the right kidney (*). (e) At the level of the right lower pole, only a small amount of normally enhanced parenchyma is seen. It is compressed and distorted by nephroblastomatosis.

genital physical anomalies. In one child with hemihypertrophy, nephroblastomatosis was confined to the kidney with the Wilms tumor.

Despite the fact that the anterior and posterior surfaces of the kidney were seen more thoroughly with US than with excretory urography and

- **Which of the following will not give you bladder wall thickening?**
 - a. neurogenic bladder secondary to diabetes
 - b. benign prostatic hypertrophy
 - c. schistosomiasis
 - d. lymphoma

C. neurogenic bladder secondary to diabetes.

- Diabetic neuropathy usually results in a form of neurogenic bladder called detrusor areflexia. Neurologic damage is focused on the sacral reflex arc, with a loss of perception of bladder distention. Therefore, the bladder just continues to fill until the intravesicle pressure exceeds the intact sphincter mechanisms, and urine just overflow dribbles. There is no functional outlet obstruction here, and the bladder is usually small and thin-walled with an *increased* capacity. *Dunnick 385-392*
- Bladder Wall thickening: > 5 mm nondistended, > 3 mm distended.
 - Causes: Tumor (TCC, lymphoma), Cystitis (radiation cystitis, infectious cystitis, or resulting from inflammatory bowel dz, appendicitis, focal diverticulitis), Outlet obstruction (benign prostatic hypertrophy, urethral stricture), Neurogenic *Primer 356, GU Requisites 205-211, 217-218* Schistosomiasis can cause a **thick-walled** fibrotic “flat-topped” bladder with high insertion of ureters. It results in submucosal bladder wall edema that gives the bladder a blurred contour on cystography. Focal strictures and, of course, calcifications can develop. *Dähnert 5th p. 965.*

- **What is most closely associated with primary megaureter?**
 - a. ipsilateral cryptorchidism
 - b. renal agenesis
 - c. often right-sided
 - d. delayed emptying of ureter

D. delayed emptying of the ureter.



- Aperistaltic segment resulting in *functional* obstruction
- See dilated ureter with nonpropulsive to-and-fro motion of urine
- L:R = 3:1
- Associated disorders (40%):
 - Contralateral: UPJ obstruction, reflux, ureterocele, ureteral duplication, renal ectopia, **renal agenesis**
 - Ipsilateral: caliceal diverticulum, megacaliosis, papillary necrosis
- ***Dahnert 5th 927***
- The principal pathology lies in the distal ureter immediately proximal to its entry into bladder. An aperistaltic juxta vesical segment secondary to faulty development of the muscle layers of the ureter (functional, non-mechanical obstruction) leads to the wave of peristalsis being not preceded by a wave of relaxation so that contrast medium fails to pass freely downwards .

- **Horseshoe kidney – what is it related to?**
 - a. UPJ obstruction
 - b. Wilms' tumor
 - c. Nephrolithiasis
 - d.

A. UPJ obstruction.

- Horseshoe kidney is the most common renal anomaly whereby the lower poles of the kidneys are fused across the midline and the kidneys are malrotated. Incidence: 1:400 births. Associated anomalies (50%): UPJ obstruction (30%), ureteral duplication (10%), Genital anomalies, Turner syndrome, other anomalies (GI, cardiac, skeletal) 30% *Primer*, 831
- In 50% associated with:
 - Caudal ectopia, vesicoureteral reflux, UPJ obstruction with hydronephrosis
- Renal calculi and infection are potential complications
 - ***Dahnert 5th 920***

- **Transplanted kidney: parvus et tardus waveform in renal artery – which of the following would you see it in?**
 - a. renal vein thrombosis
 - b. distal renal artery stenosis
 - c. proximal renal artery stenosis
 - d. rejection

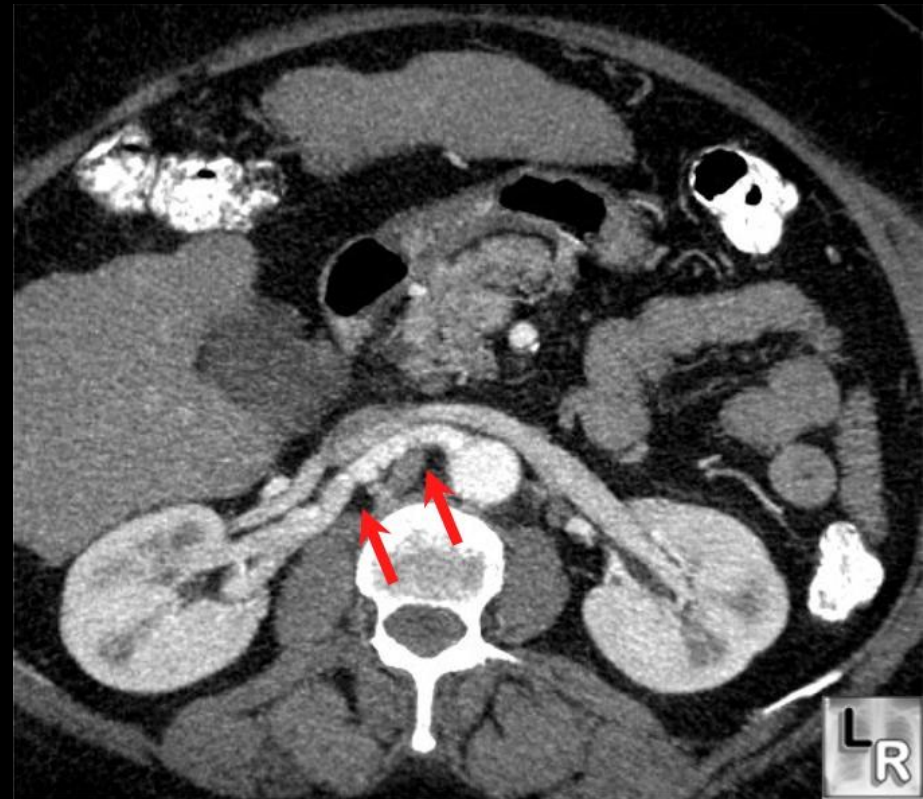
C. proximal renal artery stenosis.

- Normally, intrarenal arterial waveforms show an extremely rapid early systolic acceleration that is reflected by an almost vertical upstroke. Renal artery stenosis of the main (proximal) renal artery produces a slowed systolic upstroke and a delayed time to peak systole. This dampening of the distal arterial waveforms has been referred to as the *parvus-tardus* effect. (compare images in *Ultrasound Requisites*, fig 4-78b and fig 4-77, renal artery stenosis vs normal, pgs 111-112).. With diminished systolic waveform and little to no change in diastolic waveform, the RI will be lower in renal artery stenosis. Renal artery stenosis occurs in up to 10% of transplanted kidneys. *Ultrasound Requisites pg 142 and Diagnostic Ultrasound, 2nd ed (by Rumack et al) 381, 387-388*
- ***Dahnert 5th 957***

- **Anatomy question about the retroperitoneum:**
 - a. right renal artery is posterior to the IVC
 - b.
 - c.
 - d.

A. right renal artery is posterior to the IVC

- *see Netter, plate 324*



- Which of the following statements is *false* regarding ureteral jets?
 - a. do not occur in the third trimester
 - b. used to prove patency of the ureters
 - c. need to evaluate for 5-10 minutes
 - d. used to diagnose obstruction

do not occur in the third trimester

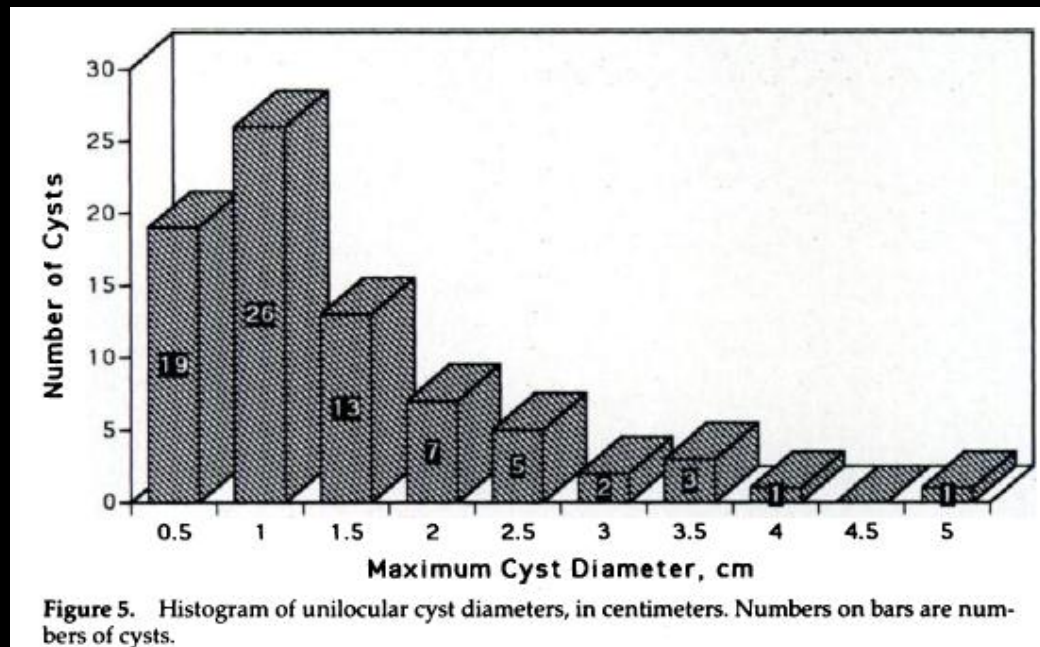
- According to “Endourology” and Dr. Bluth you have to monitor ureteral jets for 10 min
- Nevertheless, urine flow may be altered in pregnancy, simulating ureteral obstruction in some women imaged in the supine position during the second and third trimester of pregnancy. Examination in the lateral decubitus position eliminates the extrinsic ureteral compression by the enlarging uterus and may be a useful manoeuvre in most patients in the evaluation of the suspicious ureter
 - *Colour Doppler evaluation of ureteral jets in normal second and third trimester pregnancy: effect of patient position; BJR*

- **Average size of postmenopausal cysts:**
 - a. 2cm
 - b. 3cm
 - c. 4cm
 - d. 5cm

2cm

- Radiology

Simple Adnexal Cysts: The Natural History in Postmenopausal Women¹



- **The underlying etiology of MCDK is:**
 - a. medullary cystic disease
 - b. medullary sponge kidney
 - c. obstruction
 - d.

C. obstruction.

- Multicystic dysplastic kidney is a collection of large, noncommunicating cysts separated by fibrous tissue; there is no functioning renal parenchyma. Results from occlusion (**severe UPJ obstruction**) of fetal ureters before 10 weeks of gestation. Absent or atretic renal vessels and collecting system. MCDK involute in time. It is associated with UPJ obstruction in contralateral kidney and Horseshoe kidney.

Primer 836; Dahnert 5th 928-929

- **All of the following are associated with renal cysts except--**
 - a. Chronic renal failure
 - b. VHL
 - c. Tuberous sclerosis
 - d. Neurofibromatosis

D. Neurofibromatosis.

- Renal cystic disease is associated with Von Hippel-Lindau disease and Tuberous Sclerosis. Patients on hemodialysis also develop renal cysts. Most renal cysts are simple cysts, seen in > 50% of the population > 50 years of age. *Primer, 279-280; Dahnert 5th 878-879*
- *GU manifestations in NF1 are rare but include:*
 - *Renal artery stenosis due to compression by neurofibroma*
 - *Plexiform neurofibroma in bladder*
 - ***Dahnert 5th 311***

- **Captopril blocks--**
 - a. Angiotensin I to Angiotensin II conversion
 - b. Renin to Angiotensin I conversion
 - c. angiotensinogen to Angiotensin I conversion
 - d.

A. Angiotensin I to Angiotensin II conversion

- Renin converts angiotensinogen made in the liver to angiotensin I, which is converted to angiotensin II in the lungs by ACE. Some angiotensin II is produced locally within the juxtaglomerular apparatus of the kidney as well. Angiotensin II is a powerful vasoconstrictor that, in addition to peripheral vasoconstriction, produces constriction of the efferent arterioles of the glomerulus. This raises filtration pressure and thus maintains GFR when perfusion pressure drops. ACE inhibitors work by blocking the conversion of angiotensin I to angiotensin II. *Nuclear Medicine Requisites, 2nd ed, pg 337; Dahnert 5th 902*

- Captopril renal scan with right renal artery stenosis one hour post injection of captopril would show the following:
 - a. decreased initial uptake of radiotracer
 - b. initial increased perfusion to side with RAS
 - c. other choices not remembered

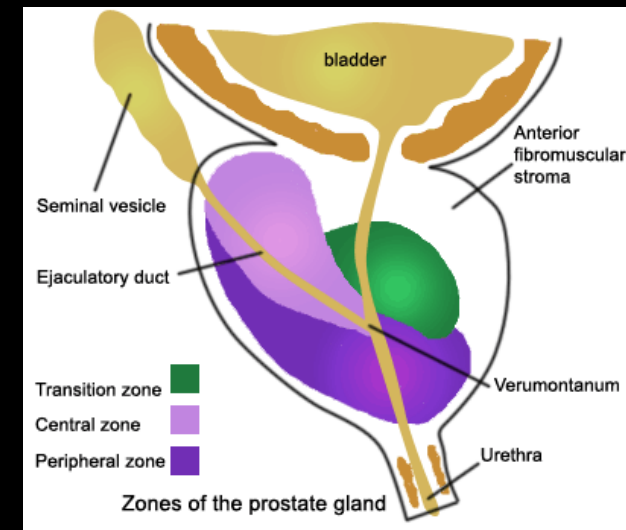
Answer: decreased initial uptake of radiotracer

- Discussion: the principle diagnostic criterion and the hallmark of renovascular hypertension is a postcaptoprill renogram that becomes abnormal or more abnormal, usually unilaterally, than the baseline renogram in which an ACE inhibitor is not used. Using the glomerular agent Tc-99m DTPA, the principle finding is diminished initial uptake of activity. There may also be prolonged parenchymal transit, resulting in parenchymal retention on the side of stenosis, which is manifested by delay in time to peak activity and excretion. If the fall in GFR is severe enough, there may be nonvisualization of a previously functioning kidney. Using primary tubular agent Tc-99m MAG3, reasonably adequate initial uptake and secretion is preserved. The reduced GFR, however results in decreased urine production and flow and therefore in decreased washout of the secreted agent. This results in cortical retention as the principle finding.
- Resources: Mettler 349-354,
<http://www.auntminnie.com/ScottWilliamsMD2/nucmed/Genitourinary/Renovascular%20hypertension/Renovascular%20hypertension.html>

- **A diagram of coronal and sagittal images of the prostate gland is provided with areas labeled. Select the following:**
 - a. area where majority of carcinomas occur - peripheral
 - b. area where benign prostatic hypertrophy (BPH) occurs – transitional
 - c. area where prostatitis occurs.
 - d.

- The prostate consists of multiple zones: the Peripheral zone, the Central zone, the Transitional zone. The PZ is located posteriorly from the base of the verumontanum to the apex of the prostate gland. The CZ is found around the ejaculatory ducts. The TZ surrounds the prostatic urethra. The anterior fibromuscular stroma contains no glandular tissue. Prostate cancer: most occur in posterior zone (70%). BPH occurs in the transitional zone. Prostatitis diffusely involves the gland. *Genitourinary Requisites* 307, 320-335 and *Primer* 321-323
- Prostate CA: 70% peripheral zone
- BPH: 82% Transitional zone
- Prostatitis: definitely involves peripheral zone
 - *Radiology*

Transrectal Ultrasound in the Diagnosis and Staging of Prostatic Carcinoma¹



2000

- **53 year old male with bladder cancer. CECT demonstrates a 2 cm adrenal lesions measuring 30 HU. What do you do next?**
 - a. Biopsy
 - b. 3 month follow-up scan
 - c. Delayed CT to reassess HU
 - d. NP-59 study
 - e. Call it a met

C. Delayed CT to reassess HU

- Assuming that 30 HU is the density on an immediate scan, delayed CT would help in assessing the contrast washout. Both lipid rich and lipid poor adenomas lose contrast much faster than an adrenal met. Adenomas have a >50% washout or < 24 HU density on a 15 min. delayed scan.CECT. Biopsy is not a good option when there are other safer and simpler options available. Adrenal biopsy has up to a 2.8% complication rate. F/U may not be prudent without adequate tumor staging. NP-59 study is useful in differentiating adenomas from non-adenomas but cannot differentiate a met from other non-adenomatous benign lesions. Cannot call it a met without proving it to be one. *Uroradiology-Dunnick/Sandler, Primer p. 317-318*
- “<37 HU on delayed (5-15min) CECT is **DIAGNOSTIC** of adenoma”
— ***Dähnert 5th ed p. 910***

- **50 yo female with bladder cancer. CT shows 2.5cm left adrenal mass (-30 HU):**
 - a. metastasis
 - b. adenoma
 - c. hyperplasia
 - d. myelolipoma

D. Myelolipoma

- Unlikely tumor to metastasize to the adrenals, more commonly the tumors which have mets in the adrenals are lung, breast, kidney, bowel, ovary, melanoma.
- B. No, adenomas have HU < 10 and may be up to 37 with delayed contrast enhancement (5-15min).
- C. Hyperplasia is not usually unilateral.
- D. Myelolipomas have HU – 30 to -115, with a mean diameter of 10cm.
*Primer 317-318, **Dähnert p. 930-931** (There is a question as to whether the question had a minus sign in front of the 30. If not, adenoma would be the best answer.)*

- **The characteristic of a renal mass that is MOST suggestive of RCC**
 - a. Enhancement of >30 HU on contrast enhanced CT.
 - b. Calcifications
 - c. Size >2 cm
 - d. Other bogus answers that keep changing

A. Enhancement of > 30 HU on contrast enhanced CT

- Renal Cell Carcinoma (RCC):
 - enhancement > 12 HU compared with NECT
 - calcifications in up to 30%
 - heterogeneous mass (if > 3cm) due to hemorrhage / necrosis
 - Renal vein thrombosis *Primer 283-284, **Dähnert 5th 950-952***

- **55 year old lady with pelvic pain. CECT of the abdomen/pelvis shows a homogeneous 2.5 cm renal mass, which measures 60 HU. What do you do next?**
 - a. Nephrectomy
 - b. Biopsy
 - c. Follow-up in 6 months
 - d. NECT
 - e. DMSA renal scintigraphy
 - f. excision

D. NECT

- NECT is essential to assess enhancement. A hemorrhagic cyst could present as the above described mass. However, it would not enhance (increase >10 HU) on CECT.
 - DMSA scan would show a photopenic defect in either case and not be able to differentiate between a complex/ hemorrhagic cyst and solid neoplasm. DMSA would be useful in distinguishing a renal ***Dahnert 5th 952-953***

- **Regarding Conn's syndrome, which is NOT seen?**
 - a. Hybernatriemia
 - b. Hypokalemia
 - c. Hypertension
 - d. Increased renin
 - e. Increased aldosterone

D. Increased renin

- Conn's syndrome is hyperaldosteronism and causes Na^+ reabsorption, K^+ secretion, secondary hypertension and suppresses renin secretion. Usually secondary to an adrenal adenoma (75%), or hyperplasia (25%); rather than carcinoma (1%)
- ***Dähnert 5th p. 915***

- **Adenomyosis – which is false:**
 - a. more common in nulliparous women
 - b. can have normal appearance on US
 - c. can be mistaken for a fibroid
 - d. a result of invagination of the decidua basalis

A. more common in nulliparous women

- Seen in multiparous women >30 years during menstrual life. Most lesions are microscopic and not seen by US. Can be clinically and sonographically difficult to distinguish from a fibroid. It is an invasion of the myometrium by the endometrium.
- ***Dähnert 5th ed p. 1022 & US Requisites p. 403.***

- **CT sign of urolithiasis**
 - a.comet tail sign
 - b. tissue rim sign
 - c. perinephric hemorrhage
 - d. lucent center
 - e. seminal vesicle displacement

B. tissue rim sign

- A and D are signs of phlebolith, perinephric fluid not hemorrhage is associated with stone and tissue rim sign is associated with stone and describes the edematous wall of the ureter proximal to it.
- *p. 197 Sandler, Dähnert 5th ed p. 982*

- **Column of Bertin**
 - a. Technetium
 - b. DTPA, optional treatment with Lasix
 - c. DTPA with captopril
 - d. MAG-3
 - e. DMSA

E. DMSA

- Functional imaging is not the key, cortical imaging is the key in distinguishing a Column of Bertin (pseudotumor) from tumor. DMSA is a cortical/ morphologic agent. Glucoheptonate functions as both a cortical and functional agent, but has mostly been replaced by MAG3. Tc-99m DMSA is best for evaluating for renal cortical defects (tumors, cysts, hematoma, scar, infarct, abscess).
- ***Dahnert 5th 1113-1115***

- **All of the following regarding mesoblastic nephroma are true *except*:**
 - a. excellent prognosis following resection
 - b. appearance similar to that of Wilm's tumor on ultrasound
 - c. has a cystic appearance with fine septations
 - d. unlikely to calcify

C. has a cystic appearance with fine septations

- Predominantly solid tumor which may appear as complex heterogeneous mass with hemorrhage, cyst formation and necrosis.
- Mesoblastic nephroma is a nonfamilial benign fibromyomatoid mass arising from renal connective tissue.
 - most common renal neoplasm in neonate (3% of all renal neoplasms in children)—almost always < 2 yo.
 - Has been described as a congenital Wilms' tumor. Cases with a low grade malignancy have been reported and may be confused with Wilms' tumor.
 - excision usually is performed for diagnosis rather than cure because radiographically these tumors can mimic malignant renal neoplasms, such as Wilm's tumor. With hematuria (20%) / hypertension (4%), anemia. It usually replaces 60 - 90% of renal parenchyma and is usually solid but may produce multiple cystic spaces. The most common US pattern is homogenously echoic reflecting the smooth mass of fibromatous cells. Excellent prognosis—cure is usually achieved by nephrectomy.
- ***Dähnert 5th ed p. 927-928 and Dunnick/Sandler Page 136***

- **Pelvoinfundibularatresia is associated with which of the following conditions**
 - a. MCDK
 - b. AD-PCKD
 - c. AR-PCKD
 - d. Wilm's tumor

A. MCDK

- Result of in utero UPJ obstruction. *Peds reqs pg 160.*
- Unilateral MCDK: most common form, 80-90%. Secondary to pelvoinfundibular atresia.
- ***Dähnert 5th p. 928.***

- **Regarding prostate cancer, which is true**
 - a. most hypoechoic lesions are cancer
 - b. increase intensity seen on T2 compare to the peripheral zone
 - c. PSA density is higher in cancer than in BPH
 - d. Rectal coil is contraindicated after biopsy
 - e. bone scan indicated after prostatectomy and PSA = 0

C. PSA is higher in cancer than BPH

- PSA “velocity”: serial PSA evaluation”
 - if annual rate of PSA increase is $> 20\%$ or $> 0.75 \text{ ng/mL}$, the chance of cancer increases sharply. 60% Cancer is hypoechoic, but only 20-30% of hypoechoic lesions are cancer. Cancer tissue is higher in PSA than benign tissue. MR: low-signal abnormality within the normally high-signal glandular tissue on T2WI
- ***Dähnert 5th ed p. 940, Primer 3rd ed p. 323***
- Hypoechoic lesions are nonspecific
- Prostate CA usually hypointense on T2WI relative to high signal glandular tissue
- Bone scan indicated when $\text{PSA} > 0$ after prostatectomy
- No specific info on contraindications to rectal coil post biopsy, but MR is usually performed after the diagnosis is made, so I doubt it's contraindicated.

- **The most likely origin of a prostate carcinoma is?**
 - a. Peripheral
 - b. Central
 - c. Periurethral
 - d. transitional

A. peripheral

- 70% cancers in peripheral zone
- ***GU Requisites 321; Primer 322-323***

- **In a patient who is S/P TURP, which area is the most likely to contain stricture?**
 - a. bladder neck /prostatic urethra
 - b. membranous urethra
 - c. penile urethra
 - d. bulbous urethra
 - e. fossa navicularis

B. Membranous urethra

- Iatrogenic strictures most commonly occur in parts of the urethra that are anatomically fixed and narrow, ie membranous urethra and penoscrotal junction. ***GU Requisites 236***
- Membranous urethral strictures occur in up to 6 percent of patients who undergo transurethral resection of the prostate (TURP).
 - *<http://www.urology.wustl.edu/PatientCare/UrethralStricture.asp>*

- Bulbar urethral trauma can arise from 'fall-astride' injuries typical in bike riders, farmers and construction workers, but is more commonly the result of endoscopic trauma, including prolonged urethral catheterization (although such trauma is milder). Infection is another common cause, although the association is rather loose and non-specific urethritis is currently a much commoner cause than gonorrhoea. The third equally large category of bulbar urethral strictures occur for no apparent reason; they typically occur in young men at the junction between the proximal and middle thirds of the bulbar urethra, contain a surprisingly high content of smooth muscle on biopsy [1], and are generally designated 'congenital'[35]. These have been linked with so-called Cobb's collar [36,37] and it may be that for some reason these strictures develop at the point of fusion of the urethra from its two separate embryological origins. A narrowing at this site of the urethra is a common radiological observation which does not necessarily mean that a stricture is present [38].
- There are four main types of penile urethral strictures. i.e. infective, traumatic (usually after instrumentation), balanitis xerotica obliterans (BXO) and failed hypospadias surgery. BXO is the genital form of lichen sclerosus and in dermatological and gynaecological circles lichen sclero-sus is the preferred terminology [46].
- Membranous urethral strictures may occur as a result of transurethral resection, in which case the urethra is still in continuity, the lumen is usually still patent, the stricture is usually superficial and the real problem is when sphincter function is compromised by fibrosis. Such patients are best treated by urethral dilatation to preserve sphincter function [26].
- Less commonly but more dramatically the urethra may be ruptured in association with a pelvic fracture; this not so much a stricture in most patients but a distraction defect [19]. There is no continuity of the urethra, the lumen is (usually) completely obliterated and there is simply a block of fibrous tissue between the ends of the urethra.

- **A patient has benign prostatic hypertrophy. During the TURP procedure, most of the tissue is taken from what zone of the prostate?**
 - a. Transitional
 - b. Central
 - c. Periurethral
 - d. Peripheral

D. Transitional

- BPH occurs in transitional zone. ***Dahnert 5th 913***
- The largest and most numerous nodules... originate almost entirely within the transitional zone. *GU Req. p. 323.*

- **The most common cause of PROSTATIC urethra dilatation is?**
 - a. TURP
 - b. Detrusor-sphincter dyssynergia
 - c. STD
 - d. Previous foley catheter
 - e. Obstruction due to prostatic Ca.

A. TURP

- The prostatic urethra is generally patulous following a TURP, which removes predominantly the transitional zone of the prostate. This enlargement is secondary to a loss of prostatic mass, not downstream obstruction. As previously explained in question #18, detrusor sphincter dyssynergia results in simultaneous detrusor and sphincter contraction, and thus, a functional outlet obstruction, resulting in dilatation of the prostatic urethra. (Remember, both the intrinsic and external sphincter are located just above the urogenital diaphragm, and thus, in the distal most portion of the prostatic urethra. Thus, answer A is also true, but post-TURP is probably more common. Choices C and D are definitely false, as they would more likely cause strictures.

- **The most common etiology of reversed diastolic flow in the segmental arteries in a recently transplanted kidney is:**
 - a. cyclosporin toxicity
 - b. normal
 - c. renal vein thrombosis
 - d. renal artery stenosis
 - e. acute rejection

C. Renal vein thrombosis

- Renal vein thrombosis can occur any time after transplant, but most occur in the 1st 3 days.. Findings include a “U-shaped” / plateau-like reversal of diastolic arterial flow. (given the time course, this is probably the best answer). Both renal transplant arterial and vein thrombosis are rare complications (less than 1% of transplants) that occur in the acute post-operative period. The classic description of renal vein thrombosis is involves renal congestion and reversed diastolic flow in the arterial waveform. Acute rejection of the transplanted kidney can occur at anytime (within 5 days to 6 months). There is increased renal volume from edema. Doppler ultrasound demonstrates initial decrease in resistive index and later increase in resistive index > 0.8 (with increasing severity of rejection). There may be reversal of diastolic flow. [*however*, this reversal of diastolic flow will not occur until the RI rises, after some amount of time, making this answer less likely]. Source: **Dähnert 5th ed. p.958**; *Primer 3rd p. 301. Dunnick/Sandler pgs.236-252.*

- **The most likely cause of UPJ obstruction is:**
 - a. crossing vessel
 - b. abnormal insertion of the ureter
 - c. intrinsic ureteral abnormality
 - d. some fibrous mass

C. intrinsic ureteral abnormality

- The most common cause of CONGENITAL UPJ obstruction is a deficient or derangement of the smooth muscle fibers with associated fibrosis, which results in the failure of normal peristalsis in the affected segment and thus functional obstruction. Only 5% of the cases have extrinsic compression by an aberrant renal artery/vessel. *Dunnick/Sandler 2nd edition pgs 22-25, Dähnert 5th ed p. 978*

- **What is the most likely cause for renal vein thrombosis?**
 - a. renal cell carcinoma
 - b. diabetic nephrosclerosis
 - c. glomerulonephritis
 - d. nephritic syndrome

C. glomerulonephritis

- In adults its membranous glomerulonephritis (50% with this disease have RV thrombosis)
- A mnemonic is “**TEST MAN**”:
Thrombophlebitis, Enterocolitis (dehydration), Sickle cell dz & SLE,
Trauma, Membranous glomerulonephritis, Amyloidosis, Neoplasm
- *Dunnick/Sandler pgs 201-203, **Dähnert 5th ed p 960-961***

- **Which of the following is not associated with Kawasaki's disease?**
 - a. Gallbladder hydrops
 - b. Myocarditis
 - c. Pericardial effusion
 - d. Renal failure
 - e. Cervical adenitis

D. Renal failure

- Kawasaki's or mucocutaneous lymph node syndrome is composed of three phases. The first includes fever, conjunctivitis, cervical adenopathy, rash, mucous membrane changes, pericarditis and endocarditis. The subacute phase follows with maximum thrombocytosis, arthralgias and desquamation. The final phase has coronary artery aneurysms in up to 40% of patients 1% will have acute MI. Gallbladder hydrops is also seen. It is inferred that a disease producing myocarditis or pericarditis can produce a pericardial effusion.
- **Dähnert p. 634**, *Primer 3rd ed p. 147*, *Rudolph's Pediatrics p. 214-215*.
- Emedicine; they do have pericardial effusion and sterile pyuria

- **What is the most common cause of renal AV fistula?**
 - a. blunt trauma
 - b. renal cell carcinoma
 - c. prior biopsy
 - d. VHL
 - e. Angiomyolipoma

C. prior biopsy

- “Arteriovenous fistulas generally result from penetrating trauma, with percutaneous renal biopsy the most common cause...”
- *Ultrasound requisites. P 115; see also p. 205, Sandler, **Dähnert 5th ed p. 913***

- Indications for Hippurite (or DMSA) renal cortical scan.
 - acute pyelonephritis
 - glomerulonephritis
 - GFR determination
 - obstruction
 - (NOTE: scarring was not an answer)

acute pyelonephritis

- **A.** DMSA scanning is the most sensitive imaging modality for detecting **pyelonephritis** or scarring. It binds to proximal renal cortical tubules, and only 25% is cleared by the bladder making it a good agent for imaging the renal cortex. Acute pyelonephritis may be difficult to distinguish from scarring on a single scan; follow-up scanning is often needed. Evidence of volume loss may be a sign of scarring.
- Case Review: Unclear Medicine, pg 244.

- **All of the following demonstrate echogenic cortex on renal ultrasound *except*?**
 - a. Alport's
 - b. Lymphoma
 - c. Acute pyelonephritis
 - d. HIV nephropathy
 - e. Chronic pyelonephritis

B. lymphoma

- Renal lymphoma: single / multiple anechoic / hypoechoic masses, may show increased through transmission. *Dähnert 5th p. 924.*
- A. Alport's syndrome, congenital nephritis and sensorineural deafness, leads to cortical nephrocalcinosis and chronic renal failure. Increased echogenicity. ***Dahnert 5th 920, 873-874***
- HIV/AIDS nephropathy: increased echogenicity in 33-68%: ***Dahnert 5th 907***
- Acute pyelo: large kidney, low echogenicity; ***Dahnert 5th 942-943***
- Chronic pyelo (XGP): hypoechoic masses: ***Dahnert 5th 944-945***

- **Cowpers glands are located at the level of:**
 - a. membranous urethra
 - b. prostatic urethra
 - c. bulbar urethra
 - d. glands of Littre

A. membranous urethra

- Cowper's glands are located on either side of the membranous urethra, their ducts empty into the bulbous urethra, 2 cm distally. Prostatic urethra is where the ejaculatory ducts empty. Cowper's ducts empty into the bulbous urethra. Glands of Littre are along the entire anterior urethra, the secretions of which lubricate the urethra. *Brant & Helms p. 798-9*
- ***Dahnert 5th 905***

- **Fibromuscular dysplasia:**
 - a. typically unilateral
 - b. may cause saccular intracranial aneurysms of the carotid
 - c. more common in males
 - d. responds poorly to angioplasty

B. may cause saccular intracranial aneurysms of the carotid

- Bilateral involvement in 65% of patients
 - Carotid artery is sometimes involved in FMD, and 25% of carotid FMD have associated intracranial aneurysms.
 - Most common in young to middle aged women
 - Over 98% respond well to angioplasty *Brant & Helms p. 640,644-5*
- ***Dahnert 5th 949-950, 629***

- **Angiogram of type 1 fibromuscular dysplasia in a 43-year-old female patient with multiple transient ischemic attacks. Note the multiple saccular dilatations of the internal carotid artery between the first and second cervical vertebrae.**

— *EMEDICINE*



- **The commonest cause of focal scarring and pyelonephritis is?:**
 - a. pyelotubular backflow
 - b. pyelolymphatic backflow
 - c. abscess
 - d. ruptured fornices
 - e. focal ischemia

A. pyelotubular backflow

- A. True, vesiculo-ureteral reflux and pyelotubular backflow is the most common cause of pyelonephritis
- B. What ?
- C. No.
- D. No.
- E. Focal ischemia can cause scarring, but is unrelated to pyelonephritis.
- ***Dähnert p. 942-945***

- **Patient on a contrast CT shows decreased enhancement with a faint pyelogram in one kidney. Which is most likely?**
 - a. Renal artery stenosis
 - b. Renal vein thrombosis
 - c. Ureteral obstruction

C. ureteral obstruction (if chronic)

- Renal artery stenosis is seen in 4 % of autopsies
- Renal vein thrombosis is seen in 0.5% of autopsies
- Most common cause of unilateral delayed nephrogram
- ***Dähnert 5th ed p. 879, 921-922, 947, 960***
- RAS and RVT will give delayed nephrograms with prolonged and/or dense nephrograms
- Chronic obstruction will give delayed and diminished nephrogram
- The signs of chronic obstruction are both pyelographic and nephrographic. The pyelographic signs are a dilated pelvicalyceal system. The nephrographic signs are a normal or low density nephrogram
 - *The urographic signs of acute on chronic obstruction of the kidney; Clinical Radiology*

- **What is a reason to give lasix during a renal scan ?**
 - a. to differentiate dilated collecting system and ureters from primary megaureter
 - b. Elevated creatinine
 - c. Normal lab values
 - d.

A. to differentiate dilated collecting system and ureters from primary megaureter

- Lasix administration (20-40 mg IV) 20 minutes into exam allows assessment of renal pelvic clearance with accuracy equal to Whitaker test (DDx of obstructed vs dilated but nonobstructed pelvicalyceal system).

Dähnert p. 1113

- **Posterior urethral valves are most commonly found in which portion of the urethra?**
 - a. Prostatic urethra
 - b. Membranous urethra
 - c. Bulbous urethra
 - d. Penile urethra

A. prostatic urethra

- Posterior urethral valves occur almost always in boys, and is the most common cause in infants for urinary obstruction, they are seen usually adjacent to the distal verum montanum, in the prostatic urethra.

Dähnert p. 938-939. Netter plate 358

- **During fetal ultrasound, a urinary tract obstruction is identified. The most common cause of this finding in a male is:**
 - a. obstruction at the membranous urethra
 - b. obstruction at the prostatic urethra
 - c. obstruction at the bulbous urethra
 - d. bladder outlet obstruction

B. obstruction at the prostatic urethra

- Posterior urethral valves are congenital thick folds of mucous membrane located in the posterior urethra (prostatic + membranous portion) distal to verumontanum. Most common cause of urinary tract obstruction and leading cause of end stage renal disease among boys (1:5000-8000). Type I: (most common) mucosal folds (vestiges of Wolffian duct) extend anteroinferiorly from the caudal aspect of the verumontanum, often fusing anteriorly at a lower level. Type II: (rare) mucosal folds extend anterosuperiorly from the verumontanum toward the bladder neck (nonobstructive normal variant, probably a consequence of bladder outlet obstruction) Type III: diaphragm-like membrane located below the verumontanum (=abnormal canalization of urogenital membrane)
- ***Dähnert 5th 938-939***

- **CT with and without contrast demonstrates a 3 cm mass in the midpole of a kidney with a bifid system. The attenuation of the mass is equal to that of renal parenchyma. The most likely etiology is**
 - a. Normal(column of Bertin)
 - b. Renal cell carcinoma
 - c. Transitional cell carcinoma
 - d. Oncocytoma
 - e. Squamous cell Ca

A. normal renal tissue

- Large column of Bertin represents a large septum/cloison of Bertin or focal cortical hyperplasia or benign cortical rest or focal renal hypertrophy. It is persistence of normal septal cortex/excessive infolding of cortex usually in the presence of partial or complete duplication (bifid system). Its location is between the upper and interpolar portion. It is usually a mass <3 cm in largest diameter. The mass is continuous with renal cortex with enhancement pattern and echogenicity similar to renal cortex. The most frequent tumors occurring in the renal pelvis are transitional cell (accounting for 8% of renal tumors) but also possible are squamous cell, undifferentiated adenocarcinomas, and benign tumors.
- An oncocytoma is an epithelial cell tumor of the proximal tubule, which has some malignant potential, accounting for 5% of renal tumors. Oncocytomas are impossible to differentiate from RCC by imaging.
- Squamous cell cancers represent <1% of all renal tumors, and are associated with leukoplakia or chronic irritation. *Primer p.349*
- Oncocytomas have no association with bifid systems. In addition, its average size is 6-7.5 cm, and the tumor has homogeneously low attenuation/ hypoechogenicity (50%).
- ***Dähnert p. 878***

- **Pt with history of analgesic abuse, now presents with bilateral hydronephrosis and a 3 cm intrapelvic mass.**
 - a. SCC
 - b. RCC
 - c. TCC
 - d. Fungus ball

C. TCC

- TCC: 5% bilateral, 85% primary renal pelvic/urothelial tumors, 8x increased risk of TCC with analgesic abuse (phenacetin).
- RCC: cause hydro. 1-3% bilateral; also associated with phenacetin.
- SCC: 5-10% urothelial tumors-UPJ obstruction; associated with chronic infection and stones.
- Mycetoma: unilateral caliceal dilation with large irregular filling defect.
- Phenacetin ** (8X increase) other bladder carcinogens include: aniline dyes, pelvic radiation, tobacco**.
- ***Dähnert 5th ed p. 971, Primer 3rd ed p. 307***

- **A patient has a NORMAL IVP exam. On the follow day he has a BE. The scout film shows bilaterally dense nephrogram. The most likely source of this problem is?**
 - a. Contrast induced renal failure
 - b. Obstruction
 - c. Nephropathy
 - d. The bogus answers keep changing year to year.

A. Contrast induced renal failure

- A delayed, persistent nephrogram at 24 hours has been observed in the majority of patients with contrast nephropathy. *GU Req. p. 3.*
- ***Dahnert 5th 915-916***

- **Multiple T/F: Concerning a paraovarian cyst:**
 - a Usually located in the broad ligament.
 - b Comprise 10% of ovarian cysts
 - c. Remnant of the Wolffian duct
 - d. Remnant of the Müllerian duct
 - e. They usually respond to hormonal therapy

- **A. True. B. False C. True D. False E. False**
- Paraovarian cysts are remnants of the Wolffian duct (=mesonephric duct). In the female, the wolffian duct degenerates into the Gartner cyst, while the mesonephric tubules form into the epoophoron and paraophoron. Nonfunctional cysts, so won't change with hormonal therapy.
- 10% of all pelvic masses in women, but are not ovarian cysts
- ***Dähnert 5th 1050-1051***

- **Pt with chronic obstruction secondary to stones now presents with mass in left renal pelvis**
 - a. squamous cell
 - b. transitional cell
 - c. fungus ball
 - d. stones

A. SCC

- According to the *1997 GU requisites*, p. 216, patients with bladder stone disease are prone to develop squamous cell carcinoma secondary to chronic inflammation due to mechanical irritation.
- ***Dahnert 5th 966***

- **What cohort has the greatest sensitivity to lasix ?**
 - **myelomeningocele**

- **In a duplicated collecting system, which of the following is correct?**
 - a. Upper pole inserts medially and lower pole refluxes
 - c. Upper pole inserts posteriorly and refluxes
 - d. Lower pole inserts medial and refluxes
 - e. Lower pole inserts anteriorly and the upper pole refluxes
 - f. Lower pole inserts laterally and usually obstructs.

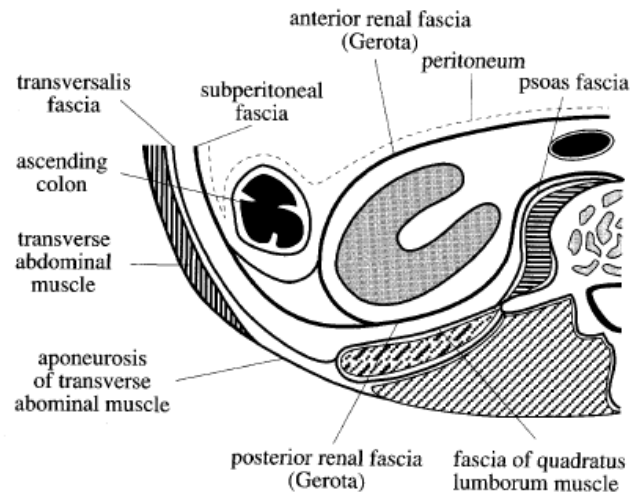
A. upper pole inserts inferior/medially and lower pole refluxes

- Weigert-Myer rule: the upper pole of a kidney drains via the ureter, which inserts inferior and medial to the normal, expected ureteral insertion point. Ectopic ureterocele occurs in 1/3 of patients with duplicated ectopic ureters. The upper pole moiety ureter is subject to obstruction & dysplasia of that portion of the kidney; the lower pole ureter typically refluxes due to its shortened tunnel into the bladder. M:F = 1:2
Genitourinary Requisites, 157; Dähnert 5th p. 977.

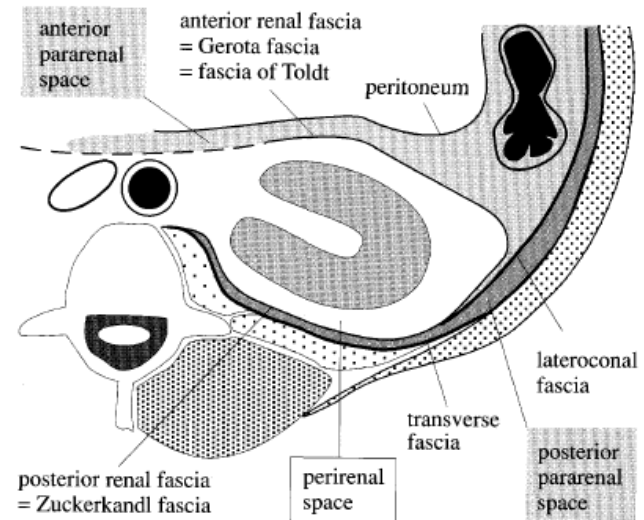
- **Which of the following is NOT in the pararenal space?**
 - a. descending colon
 - b. pancreas
 - c. duodenum
 - d. ascending colon
 - e. adrenal gland

E. adrenal gland

- The adrenal is in the **perirenal** space.
- Anterior pararenal – ascend and descend colon, duo 3rd portion, pancreas
- Posterior pararenal – fat
- Perirenal – kidneys, adrenals
- **Dahnert**

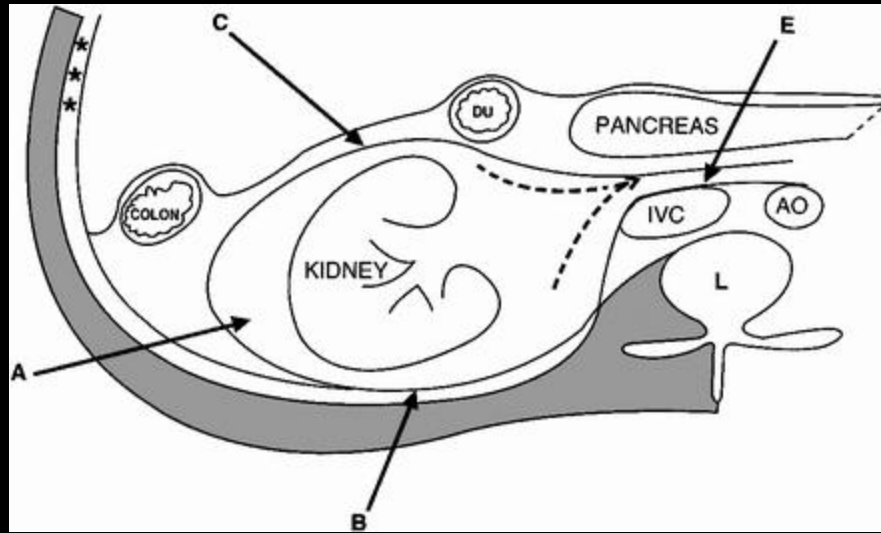


Gerota's Fascia



Pararenal Spaces

Perirenal Space



- Transverse schematic shows the layers of fascia surrounding the kidneys and outlining the pathways of communication between the extraperitoneal spaces of the abdomen and pelvis. The perirenal space (A) is contained posteriorly by the Zuckerkandl renal fascia (B) and anteriorly by the Gerota fascia (C). The properitoneal fat plane (*) is the anterior extension of the posterior pararenal space. Potential pathway between the right and left perirenal spaces (E) is illustrated passing anterior to the aorta (AO) and inferior vena cava (IVC). DU = duodenum, L = lumbar spine.

- **An oncocytoma is histopathologically classified as what?**
 - a. hamartoma
 - b. metastasis
 - c. hemangioma
 - d. normal parenchyma
 - e. epithelial cell tumor

E. epithelial cell tumor

- Oncocytoma = proximal tubular adenoma = benign oxyphilic adenoma.
 - 1-2-13% of renal tumors
 - benign, low or no metastatic potential
- Oncocytes = large epithelial cells with granular oxyphilic / eosinophilic cytoplasm
- (*GU Req p. 99*); **Dähnert 5th p. 933-934**

- **The best test for detecting nephroblastomatosis is ?**
 - a. DMSA scan
 - b. CT scan
 - c. MRI
 - d. Ultrasound
 - e. Tc-DTPA

B. CT scan

- *Dähnert pg 931-932, Primer p. 840.*

- **The ureteral prominence of the trigone is UNILATERALLY edematous. What is the most likely source of this problem?**
 - a. ureterocele
 - b. unilateral seminal vesicle infection
 - c. BPH
 - d. UTI
 - e. recently passed stone

E. Recently passed stone

- Couldn't find a definitive answer for this, but **GU Reqs 202** shows unilateral edema at the UVJ caused by a stone.
- Neoplasm should be in the differential of unilateral thickening/ edema.

- **What cancer is most prevalent in the undescended testis?**
 - a. Seminoma
 - b. Endodermal sinus tumor
 - c. Sertoli-Leydig tumor
 - d. Teratoma
 - e. Choriocarcinoma

A. Seminoma

- Most common tumor in undescended testis.
 - risk of malignancy remains elevated even after orchidopexy
 - annual screening until age 35
- Other risks: sterility, **torsion (10X risk)**
- *Primer p. 329, Dähnert 5th p. 925, 969*
 - **Radiology**

Case 70: Seminoma in an Undescended Testis¹

Cryptorchidism is also associated with infertility and is a well-recognized risk factor for testicular carcinoma. Approximately 90% of these tumors are seminomas, especially those that occur in the abdominally located testis. Although the

- **Which of the following conditions is NOT considered premalignant?**
 - a. Cystitis Glandularis
 - b. Leukoplakia
 - c. Cystitis cystica
 - d. Malakoplakia

D. Malakoplakia

- Malakoplakia is a chronic inflammatory response to gram – infection, more prevalent in patients with diabetes. Michaelis-Guttman bodies in biopsy specimen are diagnostic. Multiple yellow-brown sub-epithelial plaques are seen in the bladder giving a cobblestone appearance.
- Cystitis cystica = cystitis glandularis: premalignant
- Leukoplakia = keratinizing squamous metaplasia – result of chronic infection and stones, premalignant
- ***Dähnert p. 924, 916, 923***

- The *least* likely associated with bladder diverticulum?
 - a. congenital
 - b. Adenocarcinoma
 - c. Bladder stones
 - d.

B. Adenocarcinoma

- Bladder diverticuli can be congenital and are associated with calculi, infection, tumor.
- 40% are congenital
- “Filling defects in diverticula may be caused by stones or, rarely, carcinoma.” GU reqs 212
 - Urinary stasis predisposes to stones and infection
- Carcinoma in approx 2% (GU reqs 211), 0.8-7% (Dahnert 914)
- ***GU reqs pg 211, Dahnert p. 913-914.***

- **A patient has pyelonephritis with an obstructing stone. The patient needs a percutaneous nephrostomy, the ideal approach is**
 - a. Posterior approach through the avascular zone into a posterior calyx
 - b. Posterior approach into an anterior calyx
 - c. Anterior approach into a posterior pole
 - d. Anterior approach into an anterior pole.

A. Posterior approach through the avascular zone into a posterior calyx

- The puncture should follow Brodel's Line (an oblique posterior-lateral approach) through the avascular zone of the kidney. *Source: Kandarpa, Handbook of IR Procedures 3rd ed p.280*
- "The optimal access should enter a posterior calyx on end...". This is why the patient is prone on the fluoro/angio table! *see Ferral p. 263.* Puncture above the 10th rib may enter the pleura (pneumothorax).
- ***GU Reqs pg 374-378***

- **The most common risk factor/predisposing factor for the development of contrast induced renal failure is:**
 - a. pheochromocytoma
 - b. myeloma
 - c. pre-existing renal insufficiency
 - d.

C. preexisting renal insufficiency

- Acute Renal Failure may occur suddenly with rapid deterioration of renal function. An increase in serum creatinine of >25% or to > 1mg/dl within 2 days of receiving contrast material. The frequency is 1-30 % and represents the 3rd most common cause of in-hospital renal failure after hypotension and surgery. Risk factors:
 - Preexisting renal insufficiency (serum creatinine > 1.5 mg/dL)
 - Diabetes mellitus
 - Large volume of contrast media
 - Concomitant use of other nephrotoxic drugs
 - AHA Class IV CHF
 - Hyperuricemia
- No longer accepted risk factors
 - dehydration, HTN, proteinuria, peripheral vascular dz, age >65, multiple myeloma
- ***Dähnert 5th p.915-916***

- **Patient presents with Varicocoele, what is the treatment**
 - Permanent occlusion of spermatic vein
 - Orchiectomy
 - Alcohol ablation
 - Temporary occlusion of spermatic vein with gelfoam

A. Permanent Occlusion Of Spermatic Vein

- Varicoceles are dilatations of the veins draining the testis, or the pampiniform plexus. Primary varicoceles are idiopathic, whereas secondary varicoceles usually result from incompetent valves in the left spermatic vein. Rarely, they represent left spermatic vein, or renal vein occlusion by thrombus or tumor. They are associated with infertility and have warranted therapy as such. Permanent occlusion by endovascular therapy is now the preferred modality and utilizes a variety of devices such as inflatable balloons, coils, and sclerosing solutions. Alcohol has been used in the past for sclerotherapy, however, it is highly toxic and now rarely used. Orchiectomy is not a therapeutic option. *Dunnick p 447*
- ***Dahnert 5th 982-983***

- **ACE inhibitors (Captopril) works by:**
 - To inhibit conversion of angiotensin 1 to angiotensin 2
 - To inhibit conversion of angiotensinogen to angiotensin 1
 - To inhibit conversion of renin to angiotensinogen
 - To inhibit conversion of angiotensin 2 to aldosterone

A. Inhibits Conversion Of Angiotensin 1 To Angiotensin 2

- Angiotensinogen is a glycoprotein produced by the liver. Renin causes the liver to release angiotensin I , which is then converted to Angiotensin II by Angiotensin converting enzyme (yes, ACE) in the lung endothelium. *Physiology, Hsu.* Renin converts angiotensinogen made in the liver to angiotensin I, which is converted to angiotensin II in the lungs by ACE. Some angiotensin II is produced locally within the juxtaglomerular apparatus of the kidney as well. Angiotensin II is a powerful vasoconstrictor that, in addition to peripheral vasoconstriction, produces constriction of the efferent arterioles of the glomerulus. This raises filtration pressure and thus maintains GFR when perfusion pressure drops. ACE inhibitors work by blocking the conversion of angiotensin I to angiotensin II. *Nuclear Medicine Requisites, 2nd ed, pg 337*
- ***Dahnert 5th 902***

- **A 70yr old male with diabetes and scrotal pain has a CT that show scrotal gas, soft tissue swelling with normal epididymis and testes. The likely diagnosis is:**
 - Fournier's gangrene
 - Inguinal hernia
 - lymphoma

A. Fournier's Gangrene

- Fournier's gangrene is a necrotizing fasciitis of the penis, scrotum, and perineum with both aerobic and anerobic organisms. Half of these patients have diabetes. It is also associated with malignancy, paraplegia, and alcohol abuse. Localized cellulitis leads to a diffuse inflammatory reaction within the deep fascial planes. Diagnosis generally does not require imaging. *Dunnick 449*
- ***Dahnert 5th 919***

- **Clinicians are ordering percutaneous nephrostomy on a patient with sepsis and acute ureteric obstruction. What would you tell the clinician?**
 - I'll do it, but I want you to know the sepsis might get worse.
 - I'm not doing it until you relieve the obstruction from below.
 - It's not indicated.
 - Attempt the stone removal immediately following the PCN

- **A. I'll Do It, But I Want You To Know The Sepsis Might Get Worse.**
- In this question, no mention is made of signs of pyonephrosis, such as increased echogenicity noted in the collecting system. However, in cases like this, the obstructed kidney must be assumed as the source of sepsis until proven otherwise. Percutaneous nephrostomy and antibiotics are the standard of care. This is a temporizing measure so the infection can cool down. Surgery on an infected kidney to remove the cause of obstruction can make the patient significantly worse. In fact, percutaneous nephrostomy in this setting has a 28% complication rate of sepsis and hemorrhagic shock. *Dunnick, Barbaric 119-123*
- ***Valji 450 (449-452)***
- cultures yield important bacteriological information. The procedure is associated with minimal morbidity, facilitates definitive treatment and provides therapeutic benefit.
- ***Urol Radiol. 1989;11(2):77-81.***
Percutaneous nephrostomy in pyonephrosis.
- Antegrade treatment with percutaneous nephrostomy tube placement is indicated in any patient with hemodynamic instability or sepsis and when retrograde instrumentation may cause an inappropriate delay in treatment or unnecessary trauma to the genitourinary tract
 - *Emedicine; Pyonephrosis*

- **Concerning renal transplants, which of the following does not cause reversed renal artery flow:**
 - acute rejection
 - renal vein thrombosis
 - renal arterial stenosis

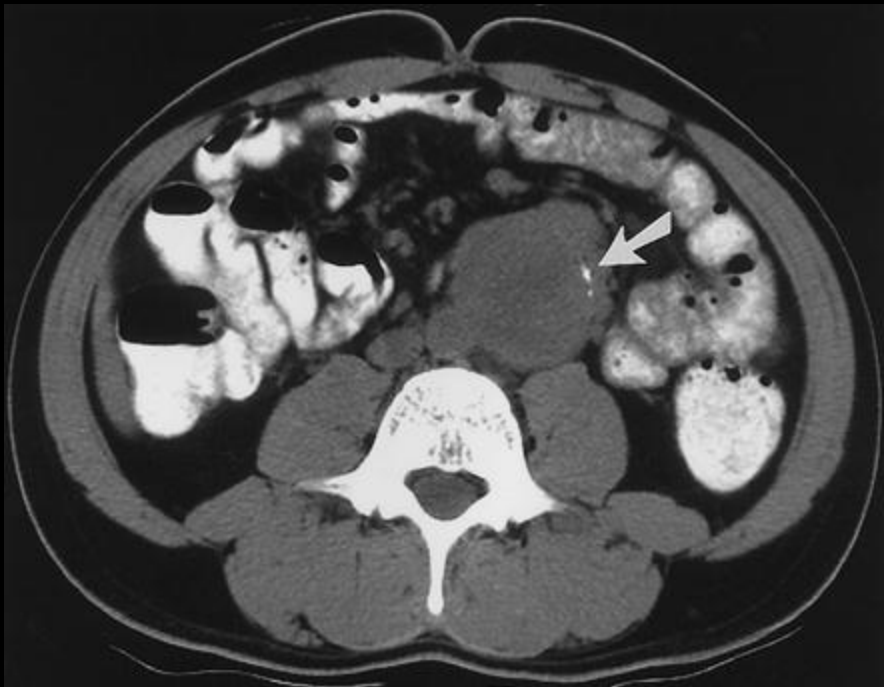
C. Renal Arterial Stenosis

- All three disorders are common complications of renal transplantation. Acute rejection and renal vein thrombosis, however, are usually encountered in the post-operative period , usually within 24-48 hours. **The most important manifestation of rejection is increased size of the graft (which is why those three-dimensional measurements are so important) and increased cortical echogenicity. In addition, there is increased arterial resistance, manifested by decreased or reversal of diastolic flow, and an increase in the resistivity and pulsatility indices. High specificity is obtained with an RI threshold of 0.9.**
- Renal vein thrombosis is the rarest of the three conditions listed above (1%). The kidney is also enlarged secondary to congestion, and thrombus is usually visible within the renal vein and an absence of flow. Doppler waveforms of the renal artery show no flow or reversed diastolic arterial flow secondary to downstream resistance.
- Renal artery stenosis is the most common complication (about 10%) and typically occurs within the first three years. Doppler hallmarks of renal artery stenosis include increased flow velocity in the stenotic segment and poststenotic distributed flow. Reversed diastolic flow is not a characteristic feature.
Zweibel.196-200
- ***Dahnert 5th 955-958***

- **Most common place for extraadrenalphaeochromacytoma – aka extraadrenalparaganglioma**
 - Lumbar sympathetic chain (Organ of Zuckerkandel)
 - Kidney
 - Thoracic chain
 - Cervical chain

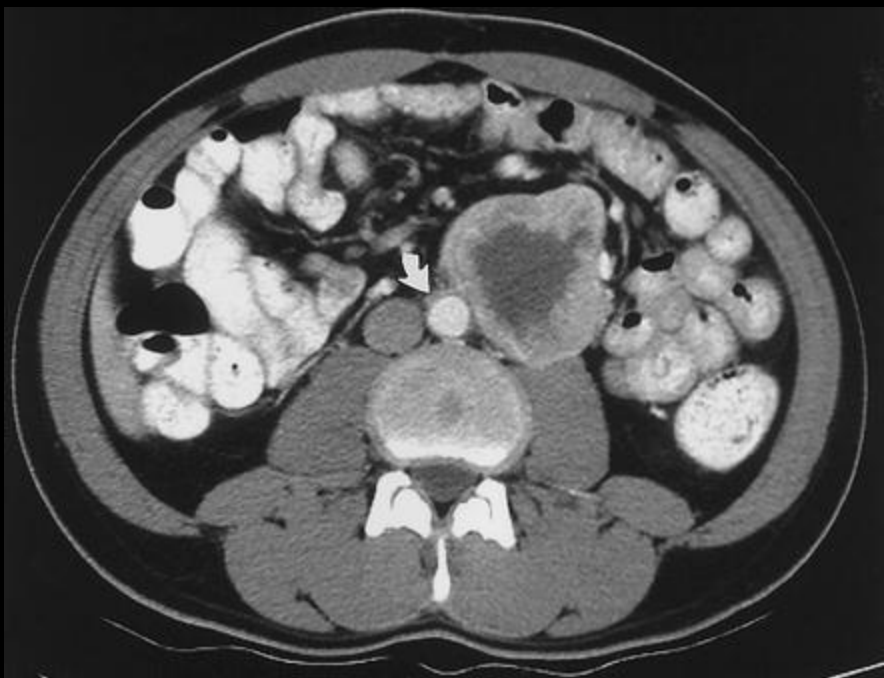
Organ of Zuckerkandel

- **lumbar sympathetic chain**
- Although 90% of paragangliomas are contained within the adrenal gland as pheochromocytomas, the remaining 10% are located elsewhere along the sympathetic chain, including the skull base and neck (5% of cases), thorax (10%), aorta (75%), and bladder (10%) (7). When a paraganglioma is suspected, CT may help identify the responsible tumor as a soft-tissue mass (usually 3 cm) along the retroperitoneal path of the sympathetic nervous system. Of the paraganglionic tissues adjacent to the aorta, the organs of Zuckerkandel are the most common site of involvement. The organs of Zuckerkandel are located along the aorta, beginning cranial to the superior mesenteric artery or renal arteries and extending to the level of the aortic bifurcation or just beyond. The highest concentration is typically seen at the origin of the inferior mesenteric artery
 - *Radiographics: Best Cases from the AFIP*
 - *Paraganglioma of the Organs of Zuckerkandel*



Pheochromocytoma involving organ of zuckercandel

- (a) Unenhanced abdominal CT scan demonstrates a 6 x 6-cm soft-tissue mass adjacent to the aorta, just superior to the bifurcation. Note the small focus of peripheral calcification (arrow).
- (b) Contrast-enhanced arterial phase CT scan demonstrates prompt peripheral enhancement with central nonenhancement. Note the thin slip of enhancing tissue just anterior to the aortic wall (arrow); this tissue is not readily distinguishable from the aorta.



- **What is not associated with bladder diverticulum**
 - Shistosomiasis
 - Congenital
 - Bladder stone
 - Bladder outlet obstruction

A. Schistosomiasis

- Bladder diverticula usually occur as a result of bladder outlet obstruction, such as in BPH or urethral stricture. Bladder stones almost always occur in the setting of urinary stasis, as would occur with bladder outlet obstruction. Bladder diverticuli can also be congenital. A congenital deficiency in bladder musculature adjacent to the UVJ results in a “Hutch” diverticulum. Schistosomiasis of the bladder results from flukes reaching the distal venules of the bladder and dying, resulting in intense granulomatous reaction. This results in edema, hematuria, and eventual bladder fibrosis and reduced volume. They are also at increased risk for transitional cell carcinoma. Schistosomiasis does not result in bladder diverticuli. *Dunnick*
- ***Dahnert 5th 913-914, 964-965***

- **Causes of bladder wall thickening and trabeculation include all except**
 - Radiation
 - Cyclophosphamide
 - Detrusor sphincter dyssnergia
 - Infectious cystitis
 - neurogenic bladder secondary to diabetes mellitus
 - spinal cord injury

E. Neurogenic Bladder Secondary To Diabetes Mellitus

- Although trabeculation is usually associated with thickening secondary to outlet obstruction, it can also be seen in non-obstructive bladder wall thickening. Therefore radiation cystitis, cyclophosphamide, hemorrhagic cystitis, and infectious cystitis may all potentially demonstrate wall thickening and trabeculation. Detrusor sphincter dyssynergia (DESD) results from suprasacral spinal cord lesions, often secondary to spinal cord trauma. There is interruption of the neural pathways connecting the pontine micturition center to the sacral micturition center. There is therefore simultaneous contraction of the detrusor (bladder) and external sphincter muscles, resulting in functional bladder outlet obstruction. Diabetic neuropathy usually results in a form of neurogenic bladder called detrusor areflexia. Neurologic damage is focused on the sacral reflex arc, with a loss of perception of bladder distention. Therefore, the bladder just continues to fill until the intravesicle pressure exceeds the intact sphincter mechanisms, and urine just overflows dribbles. There is no functional outlet obstruction here, and the bladder is usually small and thin-walled with an increased capacity. *Dunnick 385-392*
- ***Dahnert 5th 887, 890***

- **The study of choice in a 1st trimester pregnant patient with symptoms of a urinary stone:**
 - US
 - CT
 - 2- shot IVP
 - cystoscopy
 - KUB

A. US

- This should be obvious. The patient is pregnant. First check if you can see anything by techniques that do not involve ionizing radiation. Cystoscopy is an invasive procedure. Note: this has been answered on many old test as 2-shot IVP when the question stated urinary stone. If it states renal stone I definitely think US is the correct answer. “Of the various imaging modalities currently available, renal ultrasound has become the first-line screening test, while limited intravenous pyelography (IVP) or a nuclear renal scan is reserved for more complex cases. Most stones diagnosed during pregnancy pass spontaneously.”

<http://www.emedicine.com/med/topic3380.htm>

- **A man who is a quadriplegic from previous gunshot wound has acute onset of a pounding occipital headache, bradycardia, and profuse sweating and facial swelling. What is the most likely cause?**
 - a. Bladder detrusor dyssynergia**
 - B. Autonomic dysreflexia**

Answer: Autonomic dysreflexia

- Harrison's
- Autonomic dysreflexia occurs in cord lesions above T6 and may be triggered by noxious stimuli including bowel and bladder distention. Typically involves headache, diaphoresis, flushing, and paroxysmal hypertension.
 - *Emedicine; Autonomic Dysreflexia*

- **What is the most common cause of enlargement of the prostatic urethra?**
 - Detrusor dysynergia
 - stricture
 - prostatitis
 - infection
 - previous TURP

E. TURP

- This is a poor question, but the best answer is probably E. The prostatic urethra is generally patulous following a TURP. TURP, but the way, removes predominantly the transitional zone of the prostate. This enlargement is secondary to a loss of prostatic mass, not downstream obstruction. Detrusor sphincter dyssynergia results in simultaneous detrusor and sphincter contraction, and thus, a functional outlet obstruction, resulting in dilatation of the prostatic urethra. (Remember, both the intrinsic and external sphincter are located just above the urogenital diaphragm, and thus, in the distal most portion of the prostatic urethra. Thus, answer A is also true, but post-TURP is probably more common. Infection\prostatitis which is most likely gonococcus, would typically result in anterior urethral stricture, and therefore, not just prostatic urethral dilatation. *I could find no reference for this one looked in Dähnert , primer, reqs, B&H, and uro text – just saw it on old test*

- **The most potent vasoactive substance of the following is:**
 - renin
 - Angiotensin I
 - Angiotensin II

C. Angiotensin II

- Angiotensin-II is the most potent vasoconstrictor of biologic system.
Dähnert 5th p902, Weissleder p267, Harrison's 14th 2038

- **According to the Weigert-Meyer rule who has increased incontinence with duplication.**
 - Males
 - Females
 - Equal

B. Females

- Weigert-Myer rule is seen in ureteral duplication and is that the ectopic ureter drains the upper pole and enters the bladder inferiorly and medially; the ectopic ureter may be stenotic and obstructed. The orthotopic ureter drains the lower pole and enters the bladder near the trigone. The ectopic ureter has a suprasphincteric insertion in males and an infrasphincteric insertion in females, causing increased incontinence in females. *Primer p. 772; Dähnert 5th 977*
- Weigert-Meyer rule
- applies to duplex collecting systems
- upper-pole ureter
 - obstruction ==> hydronephrosis
 - inserts more inferiorly and medially in bladder
 - may insert into urethra, vagina, etc.
 - males not incontinent: insertion above ext. sphincter
 - associated with ureterocele
- lower-pole ureter
 - reflux ==> pyelonephritis

- **Causes of a striated nephrogram include all except:**
 - renal artery stenosis
 - ureteral obstruction
 - renal vein thrombosis
 - medullary sponge kidney
 - acute pyelonephritis

A. Renal Artery Stenosis

- Striated nephrogram = streaky linear bands of alternating hyper – and hypoattenuation parallel to axis of tubules + collecting ducts during excretory phase due to stasis of contrast material in dilated collecting ducts on background of edematous renal parenchyma
- Mnemonic: **CHOIR BOY**
Contusion
Hypotension (systemic)
Obstruction (ureteral)
Intratubular obstruction
Renal vein thrombosis
Bacterial nephritis (acute)
Obstruction (ureteral) – twice b\c it's so common
Yes, also cystic diseases i.e. medullary sponge kidney, infantile PCKD, and medullary cystic disease
- ***Dähnert 5th 879-880***

- **Corpus luteal cysts usually resolve by how many weeks**
 - 5
 - 10
 - 15
 - 20
 - 25

15 Weeks

- Corpus luteal cyst typically resolves before 20 weeks GA (12-15 weeks) age. Different from Corpus luteum of menstruation that resolves within 1-2 menstrual cycles
- ***Dähnert 5th p1048***
- Resolve by “mid second trimester” *US Requisites 2nd p309*

- Which is true of hysterosonography?
 - determining a cause for endometrial thickening
 - uses iodinated contrast
 - best with transabdominal transducer
 - not for postmenopausal patient
 - best in secretory phase

determining a cause for endometrial
thickening

- **Salpingitis isthmica nodosa is often associated with**
 - Hydrosalpinx
 - Endometriosis
 - Synechia
 - PID
 - Adenomyosis

PID

- The aetiology of this entity is unknown . Infection may be a secondary process. HSG shows multiple small diverticula of the Fallopian tubes. The diverticula are up to 2 mm in diameter and are usually situated on a 10 × 20 mm long segment of the proximal portions of the Fallopian tubes (Fig. 94A.32). Often both Fallopian tubes are involved and obstructed in many cases. Inflammatory changes are often found on pathological examination.
 - Grainger & Allison's Diagnostic Radiology: A Textbook of Medical Imaging, 4th Ed., p. 2217 (MD Consult)
- ***Dähnert 5th p. 1052***
 - **Associated with PID, infertility and ectopic pregnancy**

- **Persistent nephrogram seen in each except:**
 - ATN
 - Renal artery stenosis
 - Hypotension
 - chronic atrophic pyelonephritis
 - Renal vein thrombosis

D. Chronic Atrophic Pyelonephritis

- Bilateral global: systemic hypotension, intratubular obstruction from protein, tubular damage from contrast
- Unilateral global: renal artery stenosis, renal vein thrombosis, urinary tract obstruction
- Segmental: obstruction of outflow or focal parenchymal disease
- ***Danhert 5th p880***
- Differential Diagnosis of a persistent nephrogram:
 - Pre-Renal (15%) – RAS and hypotension
 - Renal (70%) – glomerulonephritis, RVT, ATN, papillary necrosis, interstitial nephritis
 - Post-Renal (15%) – obstruction
 - *MedPix*

- **Vasoactive agent responsible for hypertension in renal artery stenosis**
 - aldosterone
 - renin
 - Angiotensin I
 - Angiotensin II
 - Angiotensinogen

D. ANGIOTENSIN II

- *Dähnert 5th p902, 947*

- **A man with glomerulonephrosis has a prolonged nephrogram. What is the single most likely etiology?**
 - renal vein thrombosis
 - renal artery thrombosis
 - acute tubular necrosis
 - urinary obstruction

A. Renal vein thrombosis

- I think they meant “glomerulonephritis.”
- Membranous and membranoproliferative glomerulonephritis are the most common causes of renal vein thrombosis, which in turn causes a persistent nephrogram.
- ATN and urinary tract obstruction are causes of persistent nephrogram.
- Renal artery thrombosis results in complete lack of renal enhancement.
- ***Dahnert 5th 880, 908, 957, 960-961***

- **35 yo s/p trauma with superior and inferior pubic rami fractures and diastatic right SI joint. No blood at the meatus and prostate is in normal position. The next best step is:**

- a. CT scan
- b. Retrograde urethrogram
- c. Cystogram
- d. VCUG
- e. IVP

B. Retrograde urethrogram.

- The reported incidence of urethral injury in pelvic fractures is 4 to 17%. The single most important clinical sign of urethral injury is blood at the external meatus. Even without blood at the meatus, certain types of urethral injuries are possible (Type I for instance). No attempt should be made to pass a catheter until the urethral injury is assessed by dynamic retrograde urethrography. A cystogram should be performed after a negative RUG and after the foley has been advanced. IVP and angiograms are not indicated to assess urethral function. However, in the setting of trauma, if the patient is unstable and a pelvic arterial injury is suspected, an angiogram can be performed with possible embolization (Dunnick, Sandler Textbook of Uroradiology page 317). *Bone and Joint Imaging. 2nd. ed. Resnick, pp. 793-5; Campbell's Operative Orthopedics. 9th ed. vol. 3, p. 2434.*
- **Dähnert 5th 975, 979; GU Reqs 237-238**
- Inarguably, RUG is the standard of reference for diagnosis of urethral injury. The trauma protocol for treatment of patients with pelvic fractures dictates performance of RUG before placement of a Foley catheter (13). In most cases, this protocol is followed before the patient is brought to the CT suite. However, there are instances, such as a very busy emergency department with multiple trauma patients arriving simultaneously and issues of availability of the CT scanner or portable radiography equipment, when CT may be performed prior to RUG and placement of a Foley catheter
 - *CT Signs of Urethral Injury; Radiographics*

- **Findings associated with the worst prognosis in RCC:**
 - Contralateral kidney involvement with RCC
 - IVC tumor thrombus
 - Adenopathy
 - Ipsilateral adrenal involvement

A. Contralateral kidney involvement with RCC

- The prognosis of RCC depends on stage. However, the answer depends on how you interpret the choices. If choice (a) is considered as metastatic spread to the contralateral kidney, then this is distant spread (stage 4) and would be the right answer. However, if choice (a) refers to synchronous, bilateral tumors, then the prognosis is good assuming no distant mets. In that case, the answer would be (c). Keep in mind though that in a patient with bilateral RCC, the chances of this being metastatic spread to the contralateral kidney is higher it being synchronous tumors. Robson Staging: Stage I: confined to within renal capsule Stage II: extension into perinephric fat but confined to Gerota's fascia Stage IIIA- renal vein or IVC involvement Stage IIB- adenopathy Stage IIIC- renal vein + lymph nodes Stage IVA: extension into adjacent organs (other than ipsilateral adrenal) Stage IVB: distant mets
- *Dunnick 2nd, pp. 141-142. Dähnert 5th 950-951 Primer, 3rd, 283-284 GU Requisites, 89-99*
- Stage I - Tumor confined within capsule of kidney
- Stage II - Tumor invading perinephric fat but still contained within the Gerota fascia
- Stage III - Tumor invading the renal vein or inferior vena cava (A), or regional lymph-node involvement (B), or both (C)
- Stage IV - Tumor invading adjacent viscera (excluding ipsilateral adrenal) or distant metastases
 - *emedicine*

- **IVP on an obstructed kidney demonstrates a crescentic collection of contrast around some or one of the calyces. This is most likely from:**
 - a. contrast in an incompletely filled distended calyx
 - b. Back pressure into dilated collecting tubules
 - c. Distortion of the collecting tubules from dilated calyx

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Distortion of the collecting tubules from dilated calyx

- AJR

THE CALYCEAL CRESCENT—A ROENTGENOGRAPHIC SIGN OF OBSTRUCTIVE HYDRONEPHROSIS*

“Calyceal crescents” are the distorted collecting tubules filled with concentrated contrast medium during the early phase of urography in hydronephrosis due to obstruction.

- This sign is fundamentally different in its pathophysiology from the rim sign of hydronephrosis. The crescentsign refers to the appearance of concentrated contrast material in collecting tubules, arranged parallel to the margin of a dilated calix, which produces a thin line of contrast material at the edge of the calices, resembling a crescent. This change in tubule orientation from vertical to near horizontal, at the margin of the calix, is related to prolonged, but often incomplete, obstruction that produces gradual dilatation of the collecting system (20,21). The sign is important because it indicates that renal function within the kidney is recoverable, despite the severity of collecting system dilatation.

— *Classic Signs in urology: Crescent Sign; Radiographics*

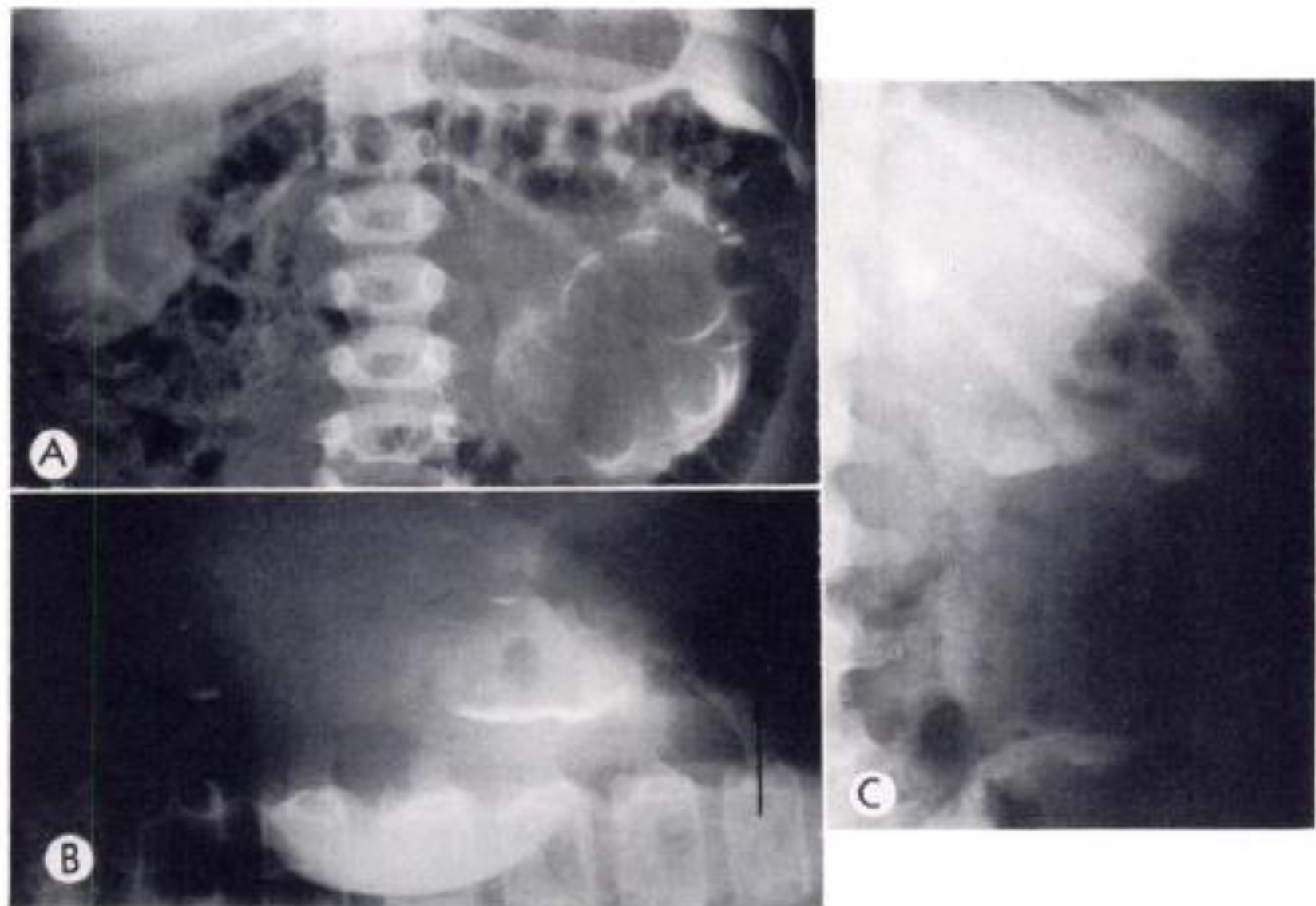


FIG. 4. (A) Calyceal crescents demonstrated on the 3 minute vertical beam roentgenogram. (B) Case 1v. Horizontal beam roentgenogram (9 min.) in a patient lying on her side. (C) Twenty minute roentgenogram with the patient erect.

- **Concerning ionic contrast agents, which is false:**

- a. completely disassociates in blood

- b. partly bound by albumin

- c. couldn't remember the rest of the answers

B. Partly bound by albumin

- Ionic contrast is **water soluble**, and completely dissociates into ionic particles when in solution.
- *Dahnert 5th 1122; GU Reqs 2-3*

- **Regarding a patient taking glucophage (metformin hydrochloride) and ionic contrast:**
 - contraindicated within 48 hours of contrast
 - reacts directly with ionic contrast
 - associated with lactic acidosis

- **1=T, 2=F, 3=T**
- glucophage is associated with lactic acidosis. ACR guidelines are to hold for 48 hours following contrast administration
- ***Dahnert 5th 1125***

- **Stage C prostate cancer is defined by (T/F):**
 - Seminal vesicle involvement
 - Rectal involvement
 - Capsular invasion
 - Bladder invasion
 - Nodal metastasis
 - Bony metastases

- Seminal vesicle involvement – True
- Rectal involvement – False
- Capsular invasion – True
- Bladder invasion – False
- Nodal metastasis – False.
- Regional node involvement connotes Stage D1 prostate cancer.
- Bony metastases – False.
Distant metastases connote Stage D2 prostate cancer.
- ***Dahnert 5th 940***
- Staging (American Urological Association System, modified Jewitt-Whitmore staging system):

- A no palpable lesion
 - A1 focal well-differentiated tumor <1.5 cm
 - A2 diffuse poorly differentiated tumor; >5% of chips from transurethral resection contain cancer
- B palpable tumor confined to prostate
 - B1 lesion <1.5 cm in diameter confined to one lobe
 - B2 tumor ³1.5 cm / involving more than one lobe
- C localized tumor with capsular involvement
 - C1 capsular invasion
 - C2 capsular penetration
 - C3 seminal vesicle involvement
- D distant metastasis
 - D1 involvement of pelvic lymph nodes
 - D2 distant nodes involved
 - D3 metastases to bone / soft tissues / organs
- At initial presentation >75% have stage C + D!

- **Concerning bicornuate uterus:**
 - a. It can be distinguished from septate uterus on hysterosalpingogram
 - b. Commonly associated with obstetric complications
 - c. Commonly associated with primary infertility
 - d.

B. Commonly associated with obstetric complications

- Uterine malformations have an incidence of 0.5%. Most often, duplications anomalies are discovered during pregnancy. Imaging modalities: US>MRI>HSG. The septate uterus is the most common mullerian anomaly. The septum often consists of fibrous tissue rather than myometrium. Has the highest incidence of reproductive failure (zygote cannot implant on fibrous tissue).
- Bicornuate uterus and septate uterus are difficult to distinguish with HSG because of a similar intrauterine appearance. Endovaginal US and MRI are better modalities to help determine the contour of the uterus. Bicornuate uterus has an increased incidence of obstetric complications. Primer, 3rd, 333 and ***GU Requisites, 253-257; Dahnert 5th 1060-1061***

- **Bilateral lateral deviation of the ureters above the level of the pelvic inlet (single best answer):**
 - aortic aneurysm
 - lymphoma
 - retroperitoneal fibrosis
 - retroperitoneal hematoma

B. Lymphoma

- Below L1-L2 and above the pelvic brim the ureter normally projects over the transverse processes (nl = pedicle to slightly lateral to the transverse processes). Lateral deviation of the middle and upper third of the ureter is most often caused by lymph node enlargement. *Dunnick, et al., Textbook of Uroradiology, p.377*
- Lateral deviation of lumbar ureter:
 - 1. Psoas muscle hypertrophy; 2. ParaAo and Paracaval nodal enlargement; 3. AAA; 4. Neurogenic tumors; 5. Fluid collections
- Medial deviation of lumbar ureter:
 - 1. Retrocaval ureter (right side only); 2. Retroperitoneal fibrosis
- ***Dahnert 5th 886***

Causes of Ureteral Deviation or Displacement

Medial Displacement or Deviation

Upper ureter

Retrocaval ureter
Retroperitoneal fibrosis

Lower ureter

Lymphadenopathy
Iliac artery aneurysm
Bladder diverticulum
Post-surgical (esp. AP resection)
Pelvic lipomatosis

Lateral Displacement or Deviation

Upper ureter

Lymphadenopathy
Aortic aneurysm
Retroperitoneal hematoma

Lower ureter

Pelvic mass, e.g. uterine fibroids

URETER

Ureteral Deviation

A. LUMBAR URETER

(a) lateral deviation (common)

1. Hypertrophy of psoas muscle
2. Enlargement of paracaval / paraaortic lymph nodes
3. Aneurysmal dilatation of aorta
4. Neurogenic tumors
5. Fluid collections (abscess, urinoma, lymphocele, hematoma)

(b) medial deviation

1. Retrocaval ureter (on right side only)
2. Retroperitoneal fibrosis

B. PELVIC URETER

(a) medial deviation

1. Hypertrophy of iliopsoas muscle
2. Enlargement of iliac lymph nodes
3. Aneurysmal dilatation of iliac vessels
4. Bladder diverticulum at UVJ (Hutch)
5. Following abdominoperineal surgery + retroperitoneal lymph node dissection
6. Pelvic lipomatosis

(b) lateral deviation with extrinsic compression

1. Pelvic mass (eg, fibroids, ovarian tumor)

- **Concerning acquired renal cystic disease (single best answer):**
 - one quarter of patients develop cancer
 - cysts are uniformly less than 1cm in size
 - cysts are located only in the medulla
 - increased number of cysts with increased time on dialysis

D. increased number of cysts with increased time in dialysis

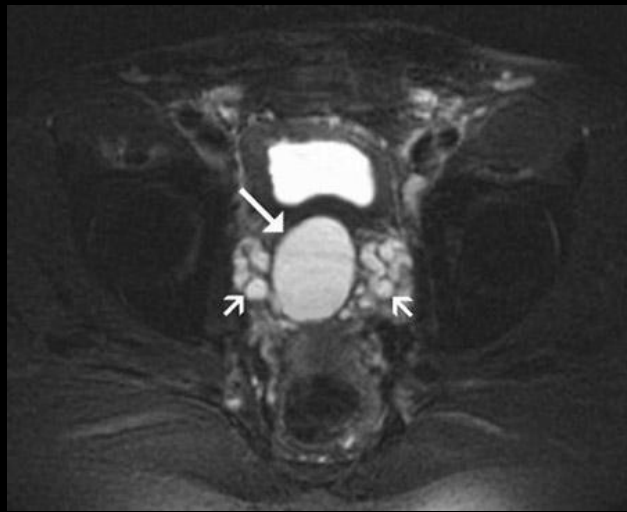
- Cysts frequently >1cm late in disease
- Cortical location
- RCC in 3-6%
- ***Dahnert 5th 907***

**Match the following cystic lesions with their location
(matching)**

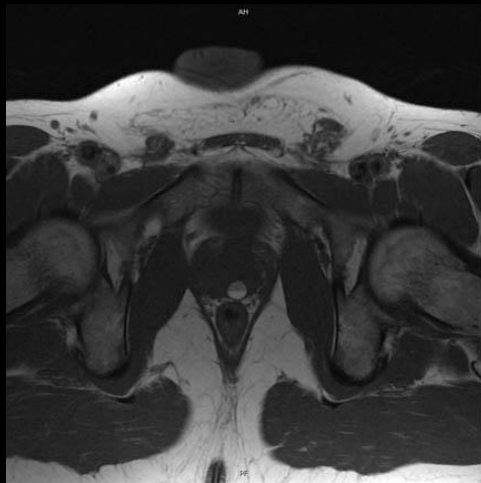
- 1. Müllerian duct cyst**
- 2. Seminal vesicle cyst**
- 3. Ejaculatory duct cyst**
- 4. Utricular cyst**

- a. Midline
- b. Paramidline
- c. lateral

- **1. Mullerian duct cyst B Midline:** Arise from region of verumontanum slightly lateral to midline
- **2. Seminal Vesicle cyst or C.:** -LATERAL (not sure about this one)
 - rare, 2/3 rds associated with ipsilateral renal agenesis
 - congenital in nature
 - if hemorrhage occurs – may appear as solid mass on CT
- **3. Ejaculatory duct cyst B. paramidline.:** -paramidline(but can occur midline) , along expected course of ejaculatory duct
 - intraprostatic cyst in central zone
 - congenital or acquired due to obstruction
 - aspirate contains sperm
 - often has calcification
- **4. Utricular cyst A Midline.:** -arise in MIDLINE from verumontanum (intraprostatic)
 - this is a Mullerian Remnant
 - connects with posterior urethra
 - typically 8 to 10 mm and does not extend above prostate
 FYI;
- Most focal cystic areas in the prostate are found with BPH originating from cystic dilatation of transitional zone glands. Acquired inclusion cysts (not associated with BPH) can occur in any zone.
- **Dahnert 5th 894, 965**
- Prostatic cysts are the most commonly encountered congenital anomalies of the prostate and have an incidence of approximately 1% in autopsy specimens. Prostatic cysts are reported in 20% of infertile males with ejaculatory duct obstruction. Prostatic cysts are characterized by their location in relation to the prostate, which may be midline (prostatic utricle and Mullerian duct cysts), paramedian (cysts of the ampulla of the vas deferens and ejaculatory duct), or lateral (seminal vesicle and prostatic cysts). They occur between the prostatic urethra or bladder anteriorly and the rectum posteriorly.



Mullerian duct cyst (midline) Unlike utricular cysts, Mullerian duct cysts do not communicate with the prostatic urethra



Utricle cyst (arises from prostate utricle)

Seminal vesicle cyst



Regarding bladder carcinoma (matching):

- 1. Squamous cell CA**
- 2. Adenocarcinoma**
- 3. TCC**

- a. schistosomiasis
- b. cyclophosphamide
- c. exstrophy
- d. prune belly syndrome

- **1. Squamous cell A.** carcinoma of the bladder is associated with Schistosomiasis infection, leukoplacia and chronic irritation/stone disease
- **2. Adenocarcinoma C.** of the bladder is associated with a patent urachus (urachal carcinoma), cystitis glandularis with metaplastic transformation, and bladder extrophy. The tumor is 7 times more frequent in males. Patients present with hematuria (70%), mucus passed per the urethra (25%), or an umbilical discharge (patent urachus). The tumor typically develops within the intra/juxtavesicular segment of the urachus- supravescical, midline, anterior (80%) this is referred to as the "space of Retzuis". On CT the lesion appears as a low attenuation mass which invades the bladder dome. Peripheral psammomatous calcification is found in up to 70% of lesions.
- **3. Transitional cell carcinoma B.** accounts for over 95% of bladder carcinomas. Patients generally present between the ages of 50-60y with painless hematuria, frequency, and dysuria. An increased risk is for TCCa is associated with: a history of prior TCCa of the upper tracts, aromatic amine exposure, tobacco use, and cyclophosphamide therapy. TCCa of the bladder is associated with a higher risk of developing a subsequent upper tract malignancy. The tumor metastasizes to local lymph nodes initially, then hematogenously to the liver and lungs. Calcification is found in less than 1% of lesions. Transitional cell carcinoma may be papillary (intraluminal) or non-papillary (infiltrative). On IVP the tumor appears as an irregular bladder filling defect or bladder wall thickening. On CT there may be a pedunculated soft tissue mass, or focal or diffuse wall thickening. Perivesicular extension or seminal vesicle involvement can be seen. Necrosis within the lesion may result in calcification rarely. Additionally, urinary salt may be deposited on the surface of the tumors. TCCa may occur within bladder diverticulum.
- ***Dahnert 5th 965, 971, 888***

- **Regarding findings on IVP examination (matching):**
 - 1. Amputated calyx**
 - 2. Polygonal multi-faceted calyces**
 - 3. Polar cortical thinning**
 - a. megacaliosis
 - b. TB
 - c. reflux
 - d. obstructive nephropathy
 - e. analgesic abuse

- **1. Amputated calyx b.**
- hallmark of renal TB are multiple ureteral and infundibular strictures. Also called “phantom” calyx.
- **2. Polygonal multifaceted calyces a.**
- Megacaliosis shows polygonal + faceted appearance of calices
- **3. Polar cortical thinning. c.**
- Reflux of infected urine leads to polar parenchymal scarring because the compound calyces found at the poles have distorted and gaping openings of the ducts of Bellini (normally slit-like).
- ***Dahnert 5th 975-976, 926, 946***

- **Regarding HIV nephropathy (multiple true/false):**
 - May be the earliest manifestation of HIV infection
 - May be associated with proteinuria and nephrotic syndrome
 - Similar sonographically to other medical renal diseases
 - Typically presents as small hyperechoic kidneys on ultrasound
 - Typically manifests as small focal bilateral renal lesions

- F, T, F, F, F
- Most often, nephropathy associated with human immunodeficiency virus type 1 (HIV-1) occurs after years of HIV-1 infection, although occasional cases of early onset have been described.¹ Among patients with early-onset HIV-associated nephropathy, most if not all had associated AIDS
 - *NEJM; Viral Load and Associated HIV Nephropathy*

- **Regarding malakoplakia (multiple true/false):**
 - a. Associated with E. coli
 - b. Females greater than males
 - c. Brunn's nest seen on histology
 - d. Pre-malignant condition
 - e. The most common site is the bladder

- a: T; b: T; c: F; d: F; e: T.
- Malakoplakia is a granulomatous inflammatory disease which affects F>M (4:1). Patients present with hematuria and obstructive complaints. The condition is associated with chronic UTI's (E. coli in 94%) and altered immunity status such as post-transplant, lymphoma, carcinoma, or diabetes. The condition most commonly affects the bladder > distal 2/3 of ureters. The ureters, renal pelvis, kidneys, testes, & prostate may also be involved, but less commonly. It is multifocal in 75% of cases and bilateral in 50%. Treatment for renal involvement is nephrectomy for unilateral disease. Bilateral or renal transplant involvement is associated with a poor prognosis. On histologic analysis there are two characteristic findings- the von Hanseman histiocyte (large foamy macrophage) with **Michaelis-Gutman bodies** (which are intra- & extracytoplasmic inclusion bodies that represent incompletely destroyed bacteria). It is NOT a pre-malignant condition. **On contrast examination there are multiple small (5mm) rounded submucosal nodules projecting into the bladder lumen.** Renal involvement is characterized by a displaced, but normal appearing pelvocalyceal system, multiple (or solitary) ill defined, irregular parenchymal masses in the renal cortex, and a decreased nephrogram with poor excretion of contrast. **On CT the only finding may be smooth, plaque-like thickening of the bladder wall.** The bladder is the most common site for malakoplakia followed by the lower 2/3's of the ureter, the upper ureter, and the renal pelvis in that order. Multifocal 75%, bilateral 50% Multiple dome shape filling defects – can cause obstruction or mass effect, even diminished or absent nephrogram. DDx: pyeloureteritis cystica
- ***Dahnert 5th 924***

- **Regarding percutaneous nephrostomy (multiple true/false):**
 - a. On AP view, the posterior calyces are projected en face
 - b. Puncture of an anterior calyx ensures entry through the avascular zone
 - c. The nephrostomy tube should be removed over a wire
 - d. There is an increased rate of complication with bladder dysfunction
 - e. Indicated in the treatment of pyonephrosis

- a. T b. F c. T d. F(?) e. T

- Indications:

- (1) external drainage of collecting system
 - (a) pyeloureteral obstruction
 - (b) urinary diversion to heal leak/fistula
 - (c) decompression of renal/perirenal fluid collections
 - (d) nondilated obstructive uropathy
 - (2) creation of tract to remove stones, dropsy, stricture dilation and antegrade ureter stenting
 - (3) manage complications from transplant kidneys
 - (4) infusion of antitumor, stone dissolving drugs, antibiotics
 - (5) urinary obstruction of pregnancy
- Relative contraindications – coagulopathy
- the posterior calyces as are- Approach: avoid hilar vessels via an oblique posterolateral approach along Brödel's line (near post. axillary line) 2 - 3 cm below 12th rib and direct toward target calix (usually middle or lower pole). Choice of calix depends on procedure and optimal access.
- Removal of nephrostomy tube - the locking mechanism (string) is cut from the tube. A guidewire is used to uncoil the loop of catheter and establish access to the renal pelvis. Always remove the tube over a wire. It prevents tube from getting caught or hung up upon removal, and maintains access to the renal pelvis if needed (to tamponade a bleed).
- Complications - overall (4%) major
- massive hemorrhage 1%
 - Ptx 1%
 - death <0.2%
 - peritonitis – rare
 - (15%) minor
 - microhematuria: common
 - pain: common
 - infxn 1.4 - 21% (45% of patients with struvite stones develop signs of infxn after PCN)
 - urine extravasation <2%
 - perirenal bleed (rare)
 - unnoticed retroperitoneal bleed 13%
 - catheter related problems 12%

- **Regarding the myometrium (matching):**
 - 1. Adherent to the wall of the myometrium**
 - 2. Invades into the myometrium**
 - 3. Invasion through the myometrium**
 - a. creta
 - b. accreta
 - c. percreta
 - d. increta
 - e. myocreta

- 1. B. Placenta accreta - underdeveloped chorionic villi in direct contact with myometrium
 - incidence 1:2500 - 7000 deliveries - 5% of placenta previa patients
 - increases with number of C-sections
 - 2. D. Placenta increta - villi invade myometrium
 - 3. C. Placenta percreta - villi penetrate through serosa of uterus
 - Imaging - thinning or absence of hypoechoic myometrium between placenta and echogenic serosa or uterine serosa - bladder interface
 - mass-like protrusions of placenta tissue beyond serosa
 - > 6 irregular vascular spaces in uterus
 - Complications
 - uterine bleeding
 - death
 - retained placenta
- Source: **Dähnert 5th 1054**

- **Regarding Wilms tumor (multiple true/false):**
 - a. Associated with familial aniridia
 - b. Encases retroperitoneal vessels
 - c. The most common malignancy in childhood to invade the IVC
 - d. Associated with Beckwith-Wiedeman syndrome
 - e. Associated with hepatoblastoma

- **a: F:**
 - associated with sporadic aniridia, not familial
- **b: F**
 - Displacement of major vessels rather than encasement
- **c: T**
 - Does invade IVC, but not sure if most common tumor to do so
- **d: T**
 - 10-20% of pts with BW get Wilms
- **e: F**
 - Beckwith Wiedeman syndrome is associated with both Wilms and to a lesser degree, hepatoblastoma
- ***Dahnert 5th 984, 1023, 713***

- **Tamoxifen demonstrates an anti-estrogen effect on the endometrium (T/F)**

False

- ANSWER: Tamoxifen is a synthetic nonsteroidal compound structurally very similar to both diethylstilbestrol (a potent estrogen) and clomiphene citrate (a weak estrogen). Tamoxifen binds estrogen receptors weakly, it suppresses FSH in menopausal women and suppresses the normal doses of estrogen used in ERT. Tamoxifen can cause either estrogen agonist or antagonist activity, depending on the particular cell involved (usually agonist). It confers a cardioprotective effect on the cardiovascular system. It inhibits bone loss, protective against osteoporosis. It acts as an agonist on the endometrium and causes proliferation in post-menopausal women in the same manner as other endogenous or exogenous estrogen. Long-term tamoxifen therapy has been associated with an increased incidence of both endometrial polyps and hyperplasia. In breast cancer patients on tamoxifen, if the endometrium appears thin (<5 mm) in an asymptomatic patient, no further investigation is required. If it is >5 mm, sonohysterographic evaluation may be warranted, followed by D & C or hysteroscopy, if necessary. (*Fleischer, Clinical Gynecologic Imaging, 1997*).
- ***Dahnert 5th 1004***

- **The following are associated with aldosterone secreting tumors of the adrenal gland (multiple true/false):**
 - Increased plasma sodium
 - Decreased serum potassium
 - Histologically very similar to cortisol-secreting tumors
 - Is located in the adrenal medulla
 - Serum renin levels are decreased

- True
- True
- False
- False
- True
- *Dähnert 5th 915, 910*

- **The most common complication associated with horseshoe kidney (single best answer):**
 - calculi
 - infection
 - hypertension
 - obstruction
 - ureteral notching

D. Obstruction

- Most commonly associated with UPJ obstruction, but infections and stones are common complications.
- ***Dahnert 5th 920***

- **Thirty-year old male with a painful swollen left scrotum. Ultrasound demonstrates a hypoechoic lesion in the left testicle:**
 - location highly indicative of neoplasm
 - elevated b-HCG and AFP imply metastatic disease
 - iliac node likely the first site of spread of disease
 - ultrasound can distinguish between benign and malignant disease

- **A. location highly indicative of neoplasm**

- The location of a scrotal mass is one of the most important determinations to be made, as the vast majority of extratesticular masses are benign, and the majority of intratesticular masses are malignant. Most testicular tumors are germ cell in origin, the seminoma being the most common (mixed are next). Seminomas begin homogeneous and hypoechoic. Mixed germ cell tumors assume a variety of appearances. Other germ cell tumors include teratomas (Ca+), embryonal cell carcinoma, choriocarcinoma. Mnemonic: "YES CT" - Yolk sac tumor (equivalent to endodermal sinus tumor of ovary, childhood, elevated AFP), Embryonal cell carcinoma, Seminoma, Choriocarcinoma, Teratoma. Non-germ cells include Leydig and Sertoli cell tumors (stromal cell tumors) and account for 5-10% of testicular tumors. 60% are pure seminomas, 40% are mixed. Seminomas met via regional lymph nodes (retroperitoneal > mediastinal > supraclavicular) and are very radiosensitive. Nonseminomatous tumors met via lymphatic & hematogenous routes (lungs > liver > bones) and are radioresistant. Germ cell tumors often secrete AFP, HCG, placental alkaline phosphatase, placental lactogen, and lactic acid dehydrogenase. Elevated levels of these markers are most often associated with non-seminomatous tumors. (9% of seminomas, 44% of teratomas, 88% of embryonal cell carcinomas [AFP only], 86% of teratocarcinomas, 75% of yolk sac tumors, and 100% of choriocarcinomas [HCG only].) These markers are used to diagnose, stage following orchiectomy, and monitoring response to therapy. They do NOT imply metastatic disease. Pure seminomas never elaborate AFP, which implies presence of nonseminomatous element. Testicular tumors have a characteristic mode of spread. In general, retroperitoneal para-aortic nodes are the first to be involved. Subsequent spread may occur to mediastinal and supraclavicular nodes. Hematogenous spread is primarily to the lungs, but liver, brain, and bones may also be involved. The histology of the met may differ from that of the primary. Ultrasound cannot distinguish between benign and malignant disease, which is why stromal tumors and the like are routinely removed. The risk of germ cell tumors in pts with undescended testes is 10X that of the normal population. 10% of testicular tumors are associated with cryptorchidism. The higher the location, the greater the risk to either testes.
- ***Dahnert 5th 892***

- **Uric acid stones are most likely to be seen in the setting of (single best answer):**
 - bowel surgery
 - polyuria
 - primary greater than secondary gout
 - aciduria

D. Adicuria

- Uric acid exists in urine free or in more soluble salt form NaUrate. Acid urine (pH <5.75) increases concentration of less soluble free form. Increasing urinary excretion of urate increases risk of stone dz (rate > 1gm/day assoc. with 50% incidence of stones; nl < 750 mg/day). Tx for urate stones includes increasing urine output > 2 L/day therefore polyuria is incorrect. Bowel surgery could lead to uric acid stones but the mechanism would be through aciduria (short gut causes chronic diarrhea causes HCO₃⁻ loss causes aciduria)
- Secondary gout confers higher risk of uric acid stones than primary gout (42% vs. 22%).
- ***Dahnert 5th 981***

- **Which of the following is least important in the prognosis of neuroblastoma (single best answer):**
 - presence of N-myc oncogene
 - presence of calcification
 - age at presentation
 - stage
 - differentiation

B. calcification

- Dahnert 5th 932-933

- **Regarding HIV nephropathy (multiple true/false):**
 - May be the earliest manifestation of HIV infection
 - May be associated with proteinuria and nephrotic syndrome
 - Similar sonographically to other medical renal diseases
 - Typically presents as small hyperechoic kidneys on ultrasound
 - Typically manifests as small focal bilateral renal lesions

- **Regarding HIV nephropathy (multiple true/false):**
 - May be the earliest manifestation of HIV infection- True
 - May be associated with proteinuria and nephrotic syndrome- True
 - Similar sonographically to other medical renal diseases False
 - Typically presents as small hyperechoic kidneys on ultrasound- False
 - Typically manifests as small focal bilateral renal lesions- False

- **a. True** (difficult to document as the first manifestation, but several sources said it can happen in asymptomatic HIV patients without AIDS-defining illness)- see Nephrology text on MD consult
- **b. True**
- **c. False**
- **d. False**
- **e. False**
- HIV Nephropathy
 AIDS patients: 38-68% develop azotemia, proteinuria, hematuria, or pyuria at some point
 HIV nephropathy = proteinuria and rapidly progressive renal failure.
 Can be in AIDS or in asymptomatic HIV; Not treatable, Fatal in 6 months
 Imaging: global enlargement without hydro or scarring
 CT: +/- increased attenuation of medulla
 U/S: big kidneys with increased echogenicity usually, but may be normal size and echoes
 Path: glomerulosclerosis and microcystic dilatation of tubules with proteinaceous casts
 Other GU dz with HIV:
 pyelo: large, poorly functioning kidneys with striated nephrogram on CT; U/S—enlarged abscesses
 pneumocystis: (especially if on aerosolized pentamidine) CT: punctate calcifications in the renal parenchyma (also seen in spleen, liver, LN, adrenals); this also can be seen in MAC and disseminated CMV
 disseminated candida: focal microabscesses in liver, spleen, and kidneys.
 U/S: bullseye lesions CT: low attenuation lesions
 NHL: if AIDS and NHL—6-12% will have renal involvement with NHL: solitary or bilateral renal masses, or engulfment of the kidneys by adjacent node masses
 KS: parenchymal involvement too small to see on imaging (usu postmortem dx) but adjacent bulky LAN may cause hydro
 Source: *Rad Clin NA 9/97* “HIV nephropathy may be seen in asymptomatic patients with HIV”—*Annals of Int. Med.* 1990
- ***Dahnert 5th 907***

- **Regarding malakoplakia (multiple true/false):**

Associated with E. coli

Females greater than males

Brunn's nest seen on histology

Pre-malignant condition

The most common site is the bladder

- a: T; b: T; c: F; d: F; e: T.
- Malakoplakia is a granulomatous inflammatory disease which affects F>M (4:1). Patients present with hematuria and obstructive complaints. The condition is associated with chronic UTI's (E. coli in 94%) and altered immunity status such as post-transplant, lymphoma, carcinoma, or diabetes. The condition most commonly affects the bladder > distal 2/3 of ureters. The ureters, renal pelvis, kidneys, testes, & prostate may also be involved, but less commonly. It is multifocal in 75% of cases and bilateral in 50%. Treatment for renal involvement is nephrectomy for unilateral disease. Bilateral or renal transplant involvement is associated with a poor prognosis. On histologic analysis there are two characteristic findings- the von Hanseman histiocyte (large foamy macrophage) with Michaelis-Gutman bodies (which are intra- & extracytoplasmic inclusion bodies that represent incompletely destroyed bacteria). It is NOT a pre-malignant condition. On contrast examination there are multiple small (5mm) rounded submucosal nodules projecting into the bladder lumen. Renal involvement is characterized by a displaced, but normal appearing pelvocalyceal system, multiple (or solitary) ill defined, irregular parenchymal masses in the renal cortex, and a decreased nephrogram with poor excretion of contrast. On CT the only finding may be smooth, plaque-like thickening of the bladder wall. The bladder is the most common site for malakoplakia followed by the lower 2/3's of the ureter, the upper ureter, and the renal pelvis in that order. Multifocal 75%, bilateral 50% Multiple dome shape filling defects – can cause obstruction or mass effect, even diminished or absent nephrogram. DDx: pyeloureteritis cystica
- ***Dahnert 5th 924***

- **Regarding percutaneous nephrostomy (multiple true/false):**
 - a. On AP view, the posterior calyces are projected en face
 - b. Puncture of an anterior calyx ensures entry through the avascular zone
 - c. The nephrostomy tube should be removed over a wire
 - d. There is an increased rate of complication with bladder dysfunction
 - e. Indicated in the treatment of pyonephrosis

- a. T b. F c. T d. F(?) e. T

- Indications:

(1) external drainage of collecting system

(a) pyeloureteral obstruction

(b) urinary diversion to heal leak/fistula

(c) decompression of renal/perirenal fluid collections

(d) nondilated obstructive uropathy

(2) creation of tract to remove stones, dropsy, stricture dilation and antegrade ureter stenting

(3) manage complications from transplant kidneys

(4) infusion of antitumor, stone dissolving drugs, antibiotics

(5) urinary obstruction of pregnancy

Relative contraindications – coagulopathy
 - the posterior calyces as are- Approach: avoid hilar vessels via an oblique posterolateral approach along Brödel's line (near post. axillary line) 2 - 3 cm below 12th rib and direct toward target calix (usually middle or lower pole). Choice of calix depends on procedure and optimal access.- Removal of nephrostomy tube - the locking mechanism (string) is cut from the tube. A guidewire is used to uncoil the loop of catheter and establish access to the renal pelvis. Always remove the tube over a wire. It prevents tube from getting caught or hung up upon removal, and maintains access to the renal pelvis if needed (to tamponade a bleed). Complications - overall (4%) major

- massive hemorrhage 1%

- Ptx 1%

- death <0.2%

- peritonitis – rare

- (15%) minor

- microhematuria: common

- pain: common

- infxn 1.4 - 21% (45% of patients with struvite stones develop signs of infxn after PCN)

- urine extravasation <2%

- perirenal bleed (rare)

- unnoticed retroperitoneal bleed 13%

- catheter related problems 12%

Regarding the myometrium (matching):

1. Adherent to the wall of the myometrium
2. Invades into the myometrium
3. Invasion through the myometrium

- a. creta
- b. accreta
- c. percreta
- d. increta
- e. myocreta

- 1. B. Placenta accreta - underdeveloped chorionic villi in direct contact with myometrium
 - incidence 1:2500 - 7000 deliveries - 5% of placenta previa patients
 - increases with number of C-sections
 - 2. D. Placenta increta - villi invade myometrium
 - 3. C. Placenta percreta - villi penetrate through serosa of uterus
 - Imaging - thinning or absence of hypoechoic myometrium between placenta and echogenic serosa or uterine serosa - bladder interface
 - mass-like protrusions of placenta tissue beyond serosa
 - > 6 irregular vascular spaces in uterus
- Complications
- uterine bleeding
 - death
 - retained placenta
- Source: **Dähnert 5th 1054**

Regarding Wilms tumor (multiple true/false):

- a. Associated with familial aniridia
- b. Encases retroperitoneal vessels
- c. The most common malignancy in childhood to invade the IVC
- d. Associated with Beckwith-Wiedemann syndrome
- e. Associated with hepatoblastoma

- **a: F:**
 - associated with sporadic aniridia, not familial
- **b: F**
 - Displacement of major vessels rather than encasement
- **c: T**
 - Does invade IVC, but not sure if most common tumor to do so
- **d: T**
 - 10-20% of pts with BW get Wilms
- **e: T**
 - Beckwith Wiedeman syndrome is associated with both Wilms and to a lesser degree, hepatoblastoma
- ***Dahnert 5th 984, 1023, 713***

Wilm's Tumor

- Familial in 1-2%; multifocal in 10%; bilateral in 4-13%
- Age: peak age at 3-4 yrs (range of 3 months to 11 years); rare during first year; 50% before 3 years, 80% before 5 years; 90% before 8 yrs; rare in neonates; M:F=1:1; more common in blacks
- WAGR syndrome (Wilms tumor, aniridia, GU abnormalities, MR)
- Drash syndrome seen with Beckwith-Wiedemann Syndrome or Hemihypertrophy; familial Wilms tumor in 1%
- Associated with
 - Sporadic aniridia (=severe hypoplasia of iris), 33% of pts with sporadic aniridia develop Wilms tumor
 - Beckwith-Wiedemann Syndrome= EMG syndrome (exomphalos, macroglossia, gigantism) + hepatomegaly, hyperglycemia from islet cell hyperplasia. 10-20% of pts with Beckwith-Wiedemann syndrome develop Wilms tumor
 - Hemihypertrophy: total/segmental/crossed (2.5%), ipsilateral or contralateral kidney affected. Increased incidence of all embryonal tumors (adrenal cortical neoplasms, hepatoblastoma)
 - GU disorders (4.4%): Drash syndrome (mal pseudohermaphroditism, progressive glomerulonephritis), Renal Anomalies (horseshoe kidney, duplex/solitary/ fused kidney). Genital anomalies: Cryptorchidism (2.8%), hypospadias (1.8%), ambiguous genitalia
- RULE OF 10's
 - 10% unfavorable histology
 - 10% bilateral
 - 10% vascular invasion
 - 10% calcifications
 - 10% pulmonary metastases at presentation

- **Tamoxifen demonstrates an anti-estrogen effect on the endometrium (T/F)?**
- **False**

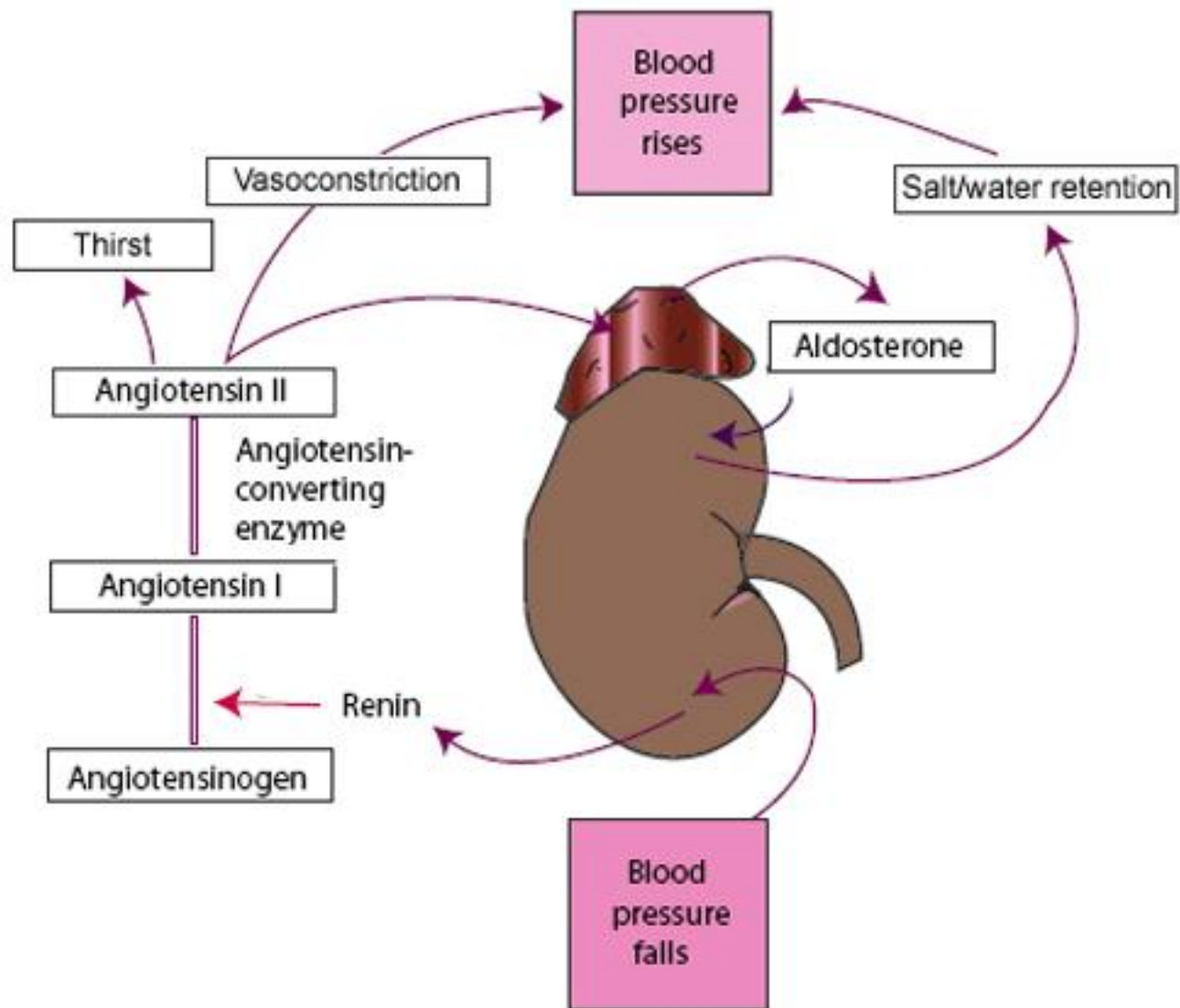
- **False.**
- ANSWER: Tamoxifen is a synthetic nonsteroidal compound structurally very similar to both diethylstilbestrol (a potent estrogen) and clomiphene citrate (a weak estrogen). Tamoxifen binds estrogen receptors weakly, it suppresses FSH in menopausal women and suppresses the normal doses of estrogen used in ERT. Tamoxifen can cause either estrogen agonist or antagonist activity, depending on the particular cell involved (usually agonist). It confers a cardioprotective effect on the cardiovascular system. It inhibits bone loss, protective against osteoporosis. It acts as an agonist on the endometrium and causes proliferation in post-menopausal women in the same manner as other endogenous or exogenous estrogen. Long-term tamoxifen therapy has been associated with an increased incidence of both endometrial polyps and hyperplasia. In breast cancer patients on tamoxifen, if the endometrium appears thin (<5 mm) in an asymptomatic patient, no further investigation is required. If it is >5 mm, sonohysterographic evaluation may be warranted, followed by D & C or hysteroscopy, if necessary. (*Fleischer, Clinical Gynecologic Imaging, 1997*).
- ***Dahnert 5th 1004***

- **The following are associated with aldosterone secreting tumors of the adrenal gland (multiple true/false):**
 - Increased plasma sodium
 - Decreased serum potassium
 - Histologically very similar to cortisol-secreting tumors
 - Is located in the adrenal medulla
 - Serum renin levels are decreased

- **The following are associated with aldosterone secreting tumors of the adrenal gland (multiple true/false):**
 - Increased plasma sodium- True
 - Decreased serum potassium- True
 - Histologically very similar to cortisol-secreting tumors- True
 - Is located in the adrenal medulla- False
 - Serum renin levels are decreased- True

Aldosterone

- a hormone that increases the reabsorption of sodium and water and the release (secretion) of potassium in the kidneys. This increases blood volume and therefore, increases blood pressure.
- Many drugs, such as spironolactone, lower blood pressure by blocking the aldosterone receptor
- Aldosterone is part of the renin-angiotensin system.
- Aldosterone is a steroid hormone (mineralocorticoid family) produced by the outer-section (zona glomerulosa) of the adrenal cortex in the adrenal gland, and acts on the distal tubules and collecting ducts of the kidney to cause the conservation of sodium, secretion of potassium, increased water retention, and increased blood pressure.
- The overall effect of aldosterone is to increase reabsorption of ions and water in the kidney.
- Its activity is reduced in Addison's disease and increased in Conn syndrome.



- **The most common complication associated with horseshoe kidney (single best answer):**
 - calculi
 - infection
 - hypertension
 - obstruction
 - ureteral notching

- **D. Obstruction**

- Most commonly associated with UPJ obstruction, but infections and stones are common complications.
- ***Dahnert 5th 920***

- **GU Thirty-five-year-old female with abdominal pain and negative IVU as an outpatient. Next day scout film performed for barium enema reveals dense kidneys bilaterally. Likely etiology is (single best answer):**
 - contrast-induced acute renal failure
 - hypotension
 - acute cortical necrosis
 - ureteral obstruction

- **A. Contrast induced renal failure.**
- The incidence of contrast induced renal failure ranges from 1-75% in several studies-There is controversy as to what true risk factors exists
Essentially diabetes and pre-existing renal function compromise are the most important
Dose of contrast and osmolality of the contrast do not appear to affect the incidence
Hydration of the patient plays controversial role – so go ahead and hydrate them
Multiple myeloma secondary to precipitation has occasionally resulted in failure. Just make sure The patient is hydrated and you can give them contrast. This is believed to result from Precipitation of myeloma (Bence Jones) proteins.-No one knows the exact mechanism of the induced renal failure-Often it is asymptomatic in outpatient and the only way to dx is by labs or seeing dense nephrograms on a subsequent study (PF or CT)-Typically it is non-oliguric and the peak serum Cr is at 3-5 days
- ***Dahnert 5th 915-916***

Persistent Nephrogram

- DDx
- Pre-Renal (15%)
 - Renal Artery Stenosis
 - Hypotension
- Renal (70%)
 - Glomerulonephritis
 - ATN
 - Papillary Necrosis
 - Renal Vein Thrombosis
 - Acute Interstitial Nephritis
- Post Renal (15%)
 - Obstruction
- Contrast Induced Nephropathy

- **Thirty-year old male with a painful swollen left scrotum. Ultrasound demonstrates a hypoechoic lesion in the left testicle:**
 - location highly indicative of neoplasm
 - elevated b-HCG and AFP imply metastatic disease
 - iliac node likely the first site of spread of disease
 - ultrasound can distinguish between benign and malignant disease

- **A. location highly indicative of neoplasm**

- The location of a scrotal mass is one of the most important determinations to be made, as the vast majority of extratesticular masses are benign, and **the majority of intratesticular masses are malignant**. Most testicular tumors are germ cell in origin, the seminoma being the most common (mixed are next). Seminomas begin homogeneous and hypoechoic. Mixed germ cell tumors assume a variety of appearances. Other germ cell tumors include teratomas (Ca+), embryonal cell carcinoma, choriocarcinoma. Mnemonic: "YES CT" - Yolk sac tumor (equivalent to endodermal sinus tumor of ovary, childhood, elevated AFP), Embryonal cell carcinoma, Seminoma, Choriocarcinoma, Teratoma. Non-germ cells include Leydig and Sertoli cell tumors (stromal cell tumors) and account for 5-10% of testicular tumors. 60% are pure seminomas, 40% are mixed. Seminomas met via regional lymph nodes (retroperitoneal > mediastinal > supraclavicular) and are very radiosensitive. Nonseminomatous tumors met via lymphatic & hematogenous routes (lungs > liver > bones) and are radioresistant. Germ cell tumors often secrete AFP, HCG, placental alkaline phosphatase, placental lactogen, and lactic acid dehydrogenase. Elevated levels of these markers are most often associated with non-seminomatous tumors. (9% of seminomas, 44% of teratomas, 88% of embryonal cell carcinomas [AFP only], 86% of teratocarcinomas, 75% of yolk sac tumors, and 100% of choriocarcinomas [HCG only].) These **markers are used to diagnose, stage following orchiectomy, and monitoring response to therapy. They do NOT imply metastatic disease**. Pure seminomas never elaborate AFP, which implies presence of nonseminomatous element. Testicular tumors have a characteristic mode of spread. In general, **retroperitoneal para-aortic nodes are the first to be involved**. Subsequent spread may occur to mediastinal and supraclavicular nodes. Hematogenous spread is primarily to the lungs, but liver, brain, and bones may also be involved. The histology of the met may differ from that of the primary. **Ultrasound cannot distinguish between benign and malignant disease**, which is why stromal tumors and the like are routinely removed. The risk of germ cell tumors in pts with undescended testes is 10X that of the normal population. 10% of testicular tumors are associated with cryptorchidism. The higher the location, the greater the risk to either testes.

- ***Dahnert 5th 892***

- **Uric acid stones are most likely to be seen in the setting of (single best answer):**
 - bowel surgery
 - polyuria
 - primary greater than secondary gout
 - aciduria

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 - bowel surgery
 - polyuria
 - primary greater than secondary gout
 - **aciduria**

Uric Acid Stones

- Acidic urine contributes to an increased concentration of the less soluble free uric acid
- Pts with urate calculi have hyperuricosuria, but do not necessarily have hyperuricemia
- Idiopathic uric acid lithiasis occurs in pts with normal serum urate levels, but with a persistently low urine pH. This is seen in pts who take medications to acidify their urine, but it also may be present in pts with chronic diarrhea or an ileostomy
- Inborn errors of metabolism may result in hyperuricemia and uric acid lithiasis. Pts with gout or Lesch-Nyhan syndrome are prone to form uric acid stones.
- Overindulgence in foods high in purine and proteins metabolized to uric acid may lead to hyperuricemia, hyperuricosuria, and uric acid stones
- The ingestion of uricosuric drugs such as salicylates and thiazides may increase the urine acid concentration sufficiently to allow uric acid stone formation
- Account for 5% - 10% of renal stones in US
- Insufficiently radiopaque to be seen on an abdominal radiograph. They account for the majority of “lucent” stones. Still sufficiently dense to be seen on CT
- Causes can include: low amount of urine, diets overly rich in animal proteins, metabolic disorders that leads to high levels of uric acid in the urine, medications, gout, diabetes, chronic diarrhea, binge drinking, anemia, lead poisoning, not eating for long periods of time,

Stones Radiolucent on Plain Radiographs

- Uric Acid
- Xanthine
- Matrix
- Pure Struvite
- Indinavir

- **Which of the following is least important in the prognosis of neuroblastoma (single best answer):**
 - presence of N-myc oncogene
 - presence of calcification
 - age at presentation
 - stage
 - differentiation

- Which of the following is least important in the prognosis of neuroblastoma (single best answer):
 - presence of N-myconcogene (unamplified)
 - presence of calcification
 - age at presentation
 - stage
 - differentiation

Prognosis of Neuroblastoma

- depends on the patient's age, the stage of disease at presentation, and the tumor site
- A favorable prognosis is seen mainly in patients younger than 1 year with low-stage disease and with lesions that arise in extra-abdominal sites.
- Patients with localized disease may have an 80% 2-year survival rate, compared with 5% for those with bone metastases.
- Several biologic markers may also affect prognosis.
- A poor prognosis is seen in patients with N-myconcogene amplification (>10 copies) and in those with allelic loss of chromosome 1p and diploid (decreased DNA) karyotype.
- In contrast, a **favorable prognosis** is seen with **unamplified N-myconcogene**, well-differentiated stroma, absence of abnormalities of chromosome 1, and triploid karyotypes.

- ***Neuroblastoma:***
 - • ***Second most common pediatric abdominal neoplasm***
 - • ***Arises from neural crest tissue, most commonly in the adrenal gland***
 - • ***Most children present between ages 1 and 5 years***
 - • ***Tends to encase vessels and may invade neuroforamina***
 - • ***Fifty percent of patients have metastases at diagnosis***

- **Which of the following is not a germ cell tumor (single best answer):**
 - Leydig cell tumor
 - choriocarcinoma
 - embryonal cell carcinoma
 - Sertoli cell tumor

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 - Leydig cell tumor
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 - Sertoli cell tumor

Testicular Tumors

- Testicular Germ Cell Tumors
 - Seminoma
 - Embryonal Cell Carcinoma
 - Choriocarcinoma
 - Teratoma
 - Teratocarcinoma
 - Yolk sac tumors
- Adults- 40-45% of germ cell tumors are seminomas followed by embryonal carcinoma, choriocarcinoma, teratoma, teratocarcinoma and other rare tumors
- Children- 70% of testis tumors are of germ cell origin and of these yolk sac tumors and teratomas comprise about 85%
- Retroperitoneal lymph node involvement often appears first at the approximate level of the renal hilum on the left and slightly lower on the right
- Inguinal and inferior iliac nodes usually are spared unless the primary tumor has invaded the skin of the scrotum or has recurred in the scrotum after orchiectomy
- Hematogenous spread usually is to the lungs

Testicular Tumors

- Nongerminal Testis Tumor
 - Leydig Cell
 - Sertoli Cell
 - Gonadoblastoma
 - Adenocarcinoma of the rete testes
 - Mesenchymalneoplasms such as fibromas and leiomyomas
 - Metastases
 - Lymphoma- primary or secondary
- Leydig cell tumors
 - Develop in the interstitial cells of the fibrovascularstroma
 - May produce testosterone and therefore may result in increased muscle mass
- Sertoli Cell Tumors
 - Develop from the basement membranes of seminiferous tubules and produce estrogen
 - Usually are benign and are rare