

## Urinary System: Vascular Disorders

### Renal Artery Stenosis <https://www.youtube.com/watch?v=46pXUkm4cT4>

- Narrowing of the lumen of the renal artery usually due to atherosclerosis.
- Change in renal perfusion – increased secretion of renin & activation of RAAS
- HTN → renal damage
- Severe stenosis → ischemic atrophy and fibrosis
  
- Diagnosis
  - Renal arteriogram – delay in appearance of contrast; lesion
  - IVP- hyper-concentration of contrast in calyceal system
  
- Symptoms
  - HTN
  - Renal bruit
  - Disparity in size of kidneys
  
- Treatment
- Antihypertensives, anticoagulants, analgesics, surgery- severe cases (percutaneous transluminal renal angioplasty); nephrectomy; embolectomy; balloon angioplasty w/ or w/o stent; renal artery bypass
  
- NDx: ineffective tissue perfusion: renal; acute pain

## Nephrosclerosis

### Nephrosclerosis

- Deterioration of renal function due to severe hypertension; benign or malignant
- Slow progression of vascular changes – years
- Spasm, thickening, hypertrophy, and hyaline degeneration* → renal failure
- Benign: adults 30-50; vascular changes; early stages with normal renal function
- Malignant: associated with malignant HTN – DBP >130
  
- Signs & Symptoms
  - Same as renal failure
  - HTN
  - Tachycardia
  - HA/dizziness
  - Fatigue
  - Palpitations
  - ↓ UO
  - Blurred vision
  
- Diagnosis
  - HTN

- UA: proteinuria, hematuria
- $\wedge$  BUN/Cr,  $\wedge$  K<sup>+</sup>,  $\vee$  Ca<sup>+</sup>
- IVP & KUB – small kidneys bilat
  
- Treatment
- Prevention – control hypertension
  - Antihypertensive's: diuretics, adrenergic blockers, vasodilators, CCB, ACE inhibitors
- Diet:
- Smoking/ ETOH
- Relaxation/Stress
- CKD interventions:
  
- Ndx: ineffective therapeutic regimen management; deficient knowledge; decrease cardiac output; ineffective coping

## Diabetic Nephropathy

### Diabetic Nephropathy

- Renal complication of diabetes
- Glomerulosclerosis caused by lesions of the arterioles & glomeruli – pyelonephritis and necrosis of the renal papillae
- DM I and the duration of diabetic state; normal vascular changes occur with age and are accelerated in a diabetic
- Afferent & Efferent arterioles are affected by thickened walls and hyaline deposits
- $\vee$  GFR ,  $\wedge$  BUN/Cr
  
- Signs & Symptoms
  - Same as CKD
  - HTN,  $\wedge$  BS
  - Edema
  - Nausea
  - Oliguria
  - HA/Dizziness/weakness
  
- Diagnosis
  - $\wedge$  BUN/Cr,  $\vee$  albumin
  - UA: proteinuria and  $\vee$  creatinine clearance
  - Renal Bx: diffuse or nodular thickening of the glomerular basement membrane
  
- Treatment
  - Same as for nephrosclerosis
  - control of diabetes
  
- Ndx: ineffective tissue perfusion, ineffective therapeutic management, deficient knowledge, imbalanced nutrition: less than body requirements

## Cancer of the Urinary System

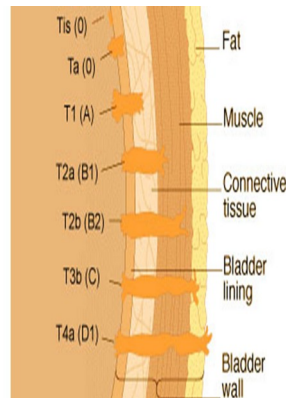
### Cancer of the Bladder

- Most common site of cancer in the urinary tract
- Incidence: > men, > Caucasian; half of cases r/t smoking
  
- Predisposing factors
  - Smoking – 3x
  - dyes / chemicals
  
- Types of bladder tumors
  - Range from small benign papillomas to large, invasive
  - Transitional cell carcinomas – most common (type of tissue only found in urinary tract)
  - Squamous cell carcinomas – less frequent, poor prognosis
  - Other: adenocarcinomas and rhabdo-myosarcomas

- Staging

Jewett-Strong-Marshall Classification – depth of invasion

| TMN<br>6th ed. | Jewett-<br>Strong-<br>Marshall | Definition                       |
|----------------|--------------------------------|----------------------------------|
| Tis            | CIS                            | Limited to mucosa, flat insitu   |
| Ta             | 0                              | Limited to mucosa, papillary     |
| T1             | A                              | Lamina propria invaded           |
| T2a            | B1                             | < halfway through muscularis     |
| T2b            | B2                             | > halfway through muscularis     |
| T3             | C                              | Perivesical fat                  |
| T4a            | C                              | Prostate, uterus or vagina       |
| T4b            | C                              | Pelvic wall or abdominal wall    |
| II1-II3        | D1                             | Pelvic lymph node(s)<br>involved |
| M1             | D2                             | Distant metastases               |



- Diagnosis
  - H & P
  - Urine for cytology – malignant cells
  - Cystoscopy with biopsy
  - IVP
  - \* need to determine the invasiveness to determine tx
  
- Signs & Symptoms
  - Hematuria (painless, intermittent)
  - Urinary symptoms (dysuria, frequency, urgency, cystitis)
  - Urine- faintly rusty to deep red

- Treatment:
  - How fast is the CA growing
  - #, size, and location of the tumor/s
  - Has it metastasized
  - Age & general health
- TURB (transurethral resection of bladder) – early or superficial
- Cystoscope
  - BCG (bacille Calmette-Guerin)- if several tumors present, stimulates immune system- s/fx: flu like s/sx, hematuria, systemic infection
- Post-Op: foley (pink tinged urine), + burning on urination; inc fluids; sitz bath
- Radiation (external beam)
  - Not curative
  - Large invasive tumors – pre-op; Can do alone if unable to tolerate surgery
  - Internal – not common
- Chemotherapy – palliative
  - Cisplatin, vinblastine, doxorubicin, and methotrexate
  - Thiotepa – intravesical; instilled directly into bladder, retained x2hr, change positions q15” to facilitate covering surface; weekly intervals for 6-12 wks; no systemic side effects
- Surgery
  - Cystectomy – CA involved most of the surface and/or has grown into the bladder wall
    - Urinary Diversion
- Male: radical cystectomy involves removal of the bladder, prostate, seminal vesicles, and perivesical tissue; may do pelvic lymphadenectomy; **causes impotence**
- Female: cystectomy- removal of the bladder, lower ureter, uterus, tubes, ovaries, cervix and urethra; may do a pelvic lymphadenectomy
- NDx: acute pain, impaired urinary elimination, r/f infection, fear

## Cancer of the Kidney

- Incidence: older, around 64 yrs of age, uncommon < 45 yrs; among 10 most common CA in both men and women, > men; rate increasing since 1990 r/t diagnostic ability
  - Predisposing factors: smoking, obesity, HTN, chemicals in the work place

Patho:

- Can arise anywhere in the kidney
- The increasing mass can compress the surrounding tissue
- Usually unilateral and slow growing
- Mets occurs at any stage – lungs, lymph, liver, bone

Robson's System of Staging Renal CA

- Stage I – tumor margins well defined and confined
- Stage II – tumor invades the fat surrounding the kidney (to adrenal gland)
- Stage III – local metastasis (lymph)
- Stage IV – metastasis to other organs (lungs, bone, liver, brain)

- **Classic triad of symptoms - late**

- Intermittent gross hematuria – delays treatment
- Pain – flank
- Palpable mass in flank
- Other: wt loss, weakness, anemia, HTN

- **Diagnosis**

- Palpable mass
- IVP – distortion of renal outline
- US – differentiate between tumor or cyst
- Renal Scan – mets
- CT scan
- Urine for cytology
- MRI
- Bx

- **Treatment**

- Radical nephrectomy – or partial; size/location
- Radiation – palliative, most resistant
- Chemo – mostly resistant, used for mets, 5-FU
- Immunotherapy – alpha interferon and interleukin 2 - mets
- Targeted Therapy – preferred tx for mets – kinase inhibitors (class used)
- NDx: Acute pain, fear, anticipatory grieving, impaired urinary elimination

## Trauma of the Urinary System

### Bladder Injuries

- Causes of bladder injuries:
  - Pelvic fractures
  - Multiple trauma
  - Sharp blows to lower trunk
  
- Signs & Symptoms
  - Suprapubic pain
  - Inability to void
  - S/sx shock – hemorrhage
    - Swelling in the scrotum, buttocks, or perineum: extraperitoneal
    - Hematuria: intraperitoneal
  
- Diagnosis
  - Cystogram – perforated bladder
  - XR – abd
  - Excretory urogram – IVP – evals kidney damage
  - CT
  - Renal angiography
  - UA

### Goals of Treatment – stabilize, surgical repair of perforations

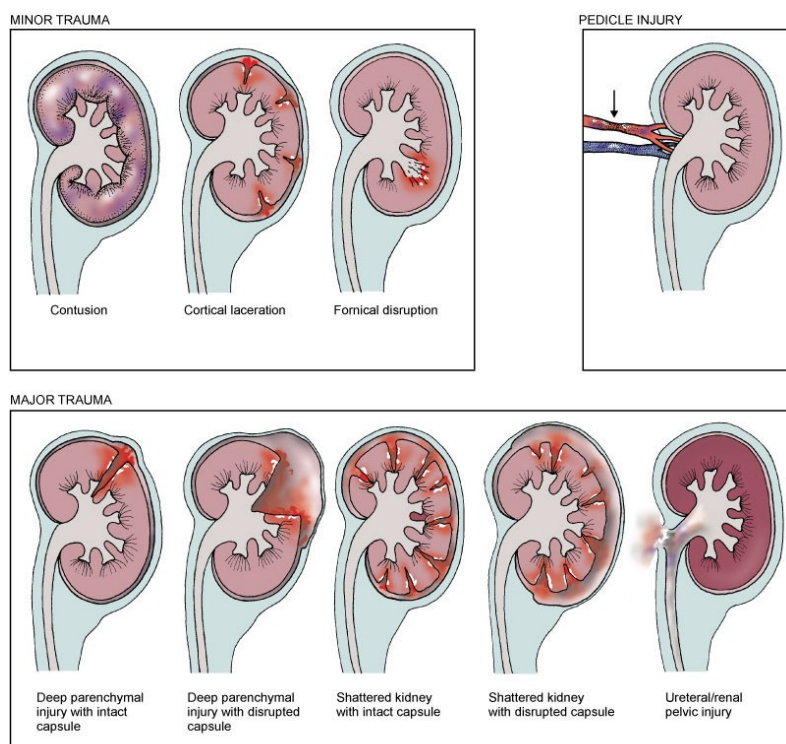
- Control bleeding – bladder rupture → hemorrhage and shock
  
- Prevent shock
  
- Promote urine drainage – cystotomy to facilitate drainage, catheter if ureteral tear
- Nsg care: VS, accurate I&O, Assess for flank pain, prepare for surgery, post-op care
- NDx: acute pain, impaired urinary elimination, r/f deficient fluid volume

### Causes of Renal Trauma

- Blunt and penetrating force = 80-85% most injuries
- Fracture of vertebral processes – 11<sup>th</sup> and 12<sup>th</sup> ribs
- MVC
- Fights
- Falls
- Contact sports
- Occupational injuries

## Renal Trauma –Classification of Injuries

- Contusion – bruise or minor tear
- Laceration – tears in renal parenchyma, damage to capsule or calyces
- Fragmentation – multiple deep lacerations with rupture or shattering of the kidney
- Major renal vessel injury – renal artery or vein; complete or partial avulsion, stretch injury of renal artery = intimal tears and thrombosis



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## Renal Trauma

- Signs & Symptoms
  - o Palpable mass on affected flank area
  - o Hematuria- most common
  - o Failure to void
  - o Pain
- Diagnosis
  - o KUB, IVP, Renal arteriogram, CT, peritoneal lavage

- Treatment
  - o Maintain tissue perfusion and preserve tissue
  - o Depends on extent of injury
  
- Conservative Management
  - o Close observation
  - o Bedrest until hematuria clears
  - o IVF
  - o F/U appts
  
- Surgery
  - o Exploration
  - o Total or Partial Nephrectomy