Vesalius SCALpel™ : Genitourinary (see also: genitourinary folios)

Trauma

kidney
- < 5% incidence renal injury in blunt trauma, requires hi energy, associated with other injuries
- mandatory imaging: shock with hematuria, contrast CT or IVP pre-op or in OR
- non-operative management: grade I-III lacs, hemodynamically stable, 90% success
  - late consequence: Page kidney = capsule scarring, increased renin, hypertension
- operative management: grade IV, V; pulsating hematoma, penetrating
  - control pedicle first, nephron sparing surgery
- back table repair if sole kidney and would need transplant after nephrectomy
- persistent bleeding, pseudoaneurysm embolize

ureteral injury
- rare, most iatrogenic (ligated, disrupted), distal 1/3
  - transection, partial, cautery, devascularize, kink by suture, crush
  - points of injury: broad ligament during hysterectomy (3/4 of injuries), sigmoid resection (2nd most common), IMA ligation, lateral pedicles of rectum, reperitonealization
- risk factors: large tumor, prior pelvic surgery, radiation, infection (diverticulitis), endometriosis
- stent doesn't prevent, but helps identify injury (late Dx: increased morbidity)
- partial injury: closure with absorbable suture over stent
- cautery injury: debride to bleeding, spatulate, repair over stent (leave 6w), drain
- late discovery: tube nephrostomy to temporize
- surgical maneuvers: psoas hitch, Boari flap, ileal conduit (proximal injury), transureteroureterostomy, renal mobilization, autotransplant

bladder injury
- 80% of bladder injuries due to pelvic fracture, bone spicule
  - 10% of pelvic fractures have bladder injury
  - 70% extraperitoneal
- blunt, seat belt injuries more likely intrapertoneal rupture
  - contrast urethrogram (at least 300cc)
- Rx:
  - intraabdominal: open repair
    - double layer absorbable, suprapubic catheter
  - extraabdominal: Foley (2-3wks)

urethra/prostate
- associated with pelvic fx
- urethral injury usually below urogenital diaphragm
- inability to void, blood at the meatus
- high riding boggy prostate
- Dx: retrograde urethrogram (pericath)

place suprapubic cath if in doubt
movement toward primary realignment
cystoscope through bladder
complications: stricture, impotence

penile fracture/testis rupture: repair tunica albuginea

Adrenal

Cushing's disease/syndrome
measure plasma and 24h urine ACTH
lo ACTH image for adrenocortical tumor, excise
hi ACTH do dexamethasone supression test
cortisol supressed = pituitary adenoma (Cushing's disease)
MRI to identify pituitary adenoma, excise
cortisol not supressed = ectopic ACTH
look for tumor

Conn's syndrome/aldosteronoma
high Na, low K, elevated urine aldosterone
non-supressible with salt load
CT/MRI to localize, differentiate adenoma from hyperplasia
adenoma excise
hyperplasia medical Rx (spironolactone)

pheochromocytoma
plasma catechols: moderate elevation 500-1,000, medium 1-2K, hi > 2K
moderate: glucagon stimulation, if high do MIBG scan, bright T2, to OR
medium: clonidine supression, if supresses " " "
high: right to MIBG
if adrenal does not light up look for extraadrenal pheo

incidentalomas on CT
check K, cortisol, catechols
functional: surgical excision
non-functional: > 4-5cm excise, < 3-4 image Q 6mo

Renal tumors

90% asymptomatic, 10% flank pain, mass, hematuria
Dx: IVP non-functioning, collecting system effacement
contrast enhanced CT: mass, adenopathy
PET lo reliability, renal angio not necessary
no bx (vascular) unless pt has only one kidney, suspicion of met to kidney, infection
Bx 50% positive rate
hi fat signal suspect angiomyolipoma (tuberous sclerosis pts)

MRI, TEE R/O tumor extension to IVC, RA
Rx: early (< 5cm) incidental discovery, excellent results (95% 5y) with partial nephrectomy (nephron sparing), 3mm margin
other indications for partial: 1 kidney, renal insufficiency, bilateral tumors
radical nephrectomy for most renal carcinomas
tumor extension/thrombus:
4 levels of tumor extension: renal vein orifice, sub-hepatic, intrahepatic, atrial
IVC to hepatics do venous bypass, extract tumor; if atrial, hypothermic arrest
metastatic: alpha interfreon &/or Il-2, 20% survival benefit
chemo and radiotherapy little long term benefit

Bladder cancer

2^{nd} most common GU tumor
85% transitional cell, occasional squamous, adeno
smoking, dyes, schistosomiasis, bladder stone (squamous & adeno)
gross/microhematuria, occasional irritability
Dx cystostopy, Bx
Rx
superficial: transurethral resection, electrocoagulation, 6 weeks intravesical BCG (therapeutic and prophylactic), monitor Q3mo
deep invasive (muscle, prostate) TURP, urinary diversion, cystectomy
options: orthotopic bladder substitute, ileal/colon conduit
metastatic: chemotherapy (MVAC-cytoxan) +/- XRT

Prostate cancer

most common male cancer
asymptomatic, not associated with BPH
risk factors: >50, black, family Hx
screen: PSA > 2.5 (age specific: > 75 PSA of 5 is normal)
> 0.75/y increase (volume of prostate proportional to PSA level)
abnormal digital rectal exam
PSA also elevated in BPH, prostatitis
PSA mostly free/unbound in BPH, if < 20% more likely cancer
transrectal needle bx if life expectance > 10y
95% adeno from acini: Gleason grade of differentiation: 1-2, 3-4, 4-5
localized: XRT, brachytherapy, radical prostatectomy (esp. young with aggressive, curable disease)
nerve sparing/continence sparing: 50-75% potency, 95% continence
metastatic (bone): hormonal blockade (several log cell kill)
almost never curative
chemo ineffective
emergency treatment spinal cord compression, pathologic fracture
ketoconazole supresses all hormones

incontinence: artificial sphincter, must deflate before inserting Foley or risk urethral necrosis

Testicular cancer

most common GU cancer younger (15-40)
risks: cryptorchidism, intersex
gynecomastia, supraclavicular mass, cough, wt. loss
Dx: scrotal US solid intratesticular mass, no Bx (violates tumor, chance inguinal node spread)
staging: CT chest/abdomen/pelvis
- I limited to testis
- II regional nodes
- III distant nodes
- IV extranodal

radical orciectomy initial step
seminoma: radiosensitive, no alphafetoprotein (AFP)
non-seminomatous
- mets common at Dx
- tumor markers:
  - endodermal sinus/yolk sac: alphafetoprotein (AFP)
  - choriocarcinoma: beta HCG, LDH
  - (pure seminoma no AFP, 10% express beta HCG)
- most cured by chemotherapy, resect residual disease
- teratoma most common post-chemo met to mediastinum
- staged resection residual: retroperitoneal lymph node dissection before mediastinum

Rx
- stage I, II: radical orchiectomy
  - seminoma XRT
  - non-seminoma: primary chemo, surveillance (if clinically localized to testicle), or retroperitoneal lymph node dissection (RPLND)
    - full or modified template, N-sparing (save L2-3 sympathetics: emission/ejactulation)
- stage IIb, III: bulky & metastatic
  - primary chemotherapy (PEB: platinum, etoposide, bleomycin)
  - post chemo may need RPLND if residual mass and markers normalized
    - if markers still elevated, more chemo
    - seminoma remove residual mass > 3cm
    - non-seminoma: 40% fibrosis, 20% viable tumor, 20% teratoma
  - follow-up all: late recurrenct to 10y, then XRT seminoma
    - non-seminoma increase AFP, beta HCG = mets, to chemoRx

Penile cancer

rare in US, squamous, circumcision prevents
risks: human papilloma virus (HPV), herpes
small: circumcision/MOHs surgery (successive frozen section excision to free margins)

invasive: partial or total penectomy (perineal urethrostomy)
metastatic, node +, give chemo: bleo/MTX/cisplatin
inguinal lymphadenectomy (4w trial keflex) do superficial groin dissection
if positive nodes do deep dissection

Hematuria

differential: infection, tumor (renal, ureter, bladder), calculus, BPH, primary renal disease (rarest)
emergency bleeding:
radiation cystitis common cause
cystoscopy, clot evacuation, fulguration, continuous bladder irrigation (alum drip, formalin drip), embolize, urinary diversion

Stone disease

lucent stones: uric acid
Rx: hydration , alkalinization, dissolve
opaque stones:
calcium oxalate, most common, cannot be dissolved
associated with irritable bowel, Crohn's
calcium phosphate associated with parathyroid disease
oxalate, phosphate stones affected by pH
struvite (ammonia, magnesium, phosphate) associated with infection
cysteine: genetic defect renal absorption

Dx
non-con CT best initial ER test
IVP for degree of obstruction, single delayed image
Rx
< 5mm toridol, strain urine
emergency: large, fever, urinary tract infection, unresponsive to pain meds, solitary kidney
percutaneous nephrostomy or ureteral stent
definitive Rx: laser, US, electrohydrolic lithotrypsy, extracorporeal shockwave lithotrypsy (ESWL) via ureteroscope or percutaneous nephrostomy tubes
ESWL effective for stones anywhere along GU tract

ureter: stent decreases risk of missing ureteral injury

BPH

not a cancer risk
50% or all males over 50, lower urinary tract symptoms
Dx: flow rate, post-void residual, urodynamics (pressure/flow)
differential Dx: urethral stricture, bladder neck contraction, neurogenic bladder

acute retention: catheter, clean intermittent catheterization
medical Rx: alpha block of smooth muscle in prostatic urethra
hytrin, cardura, flomax
5 alphareductase inhibitors (proscar)
30% reduction size prostate by decreasing stroma, not epithelium
surgery: TURP (> 100g, greater risk water intoxication), transurethral laser vaporization, open/suprapubic prostatectomy/retropubic/transvesical
water intoxication: dilutional hyponatremia
Rx lasix

Testicular torsion (acute scrotum)

sudden pain (often night), high riding testis, loss of cremaster reflex
color Doppler US
emergent restoration blood flow < 4-6h
surgical exploration, bilateral ochidopexy with permanent sutures
examine for testicular tumor

Epididymitis

slower onset than torsion, young men
atypical bacteria: gonorrhea, chlamydia, ureaplasma
older pts.: coliforms: e. coli, proteus
Rx: antibiotics, scrotal support

Varicocele

L more common (compression L renal v by SMA, longer gonadal v, result incompetent pampiniform valves)
retarded testicular growth, atrophy young man
unilateral R rare: suspect renal cancer with new varicocele either side
infertility related, (does not affect spermatogenesis)
scrotal or retroperitoneal (open/laparoscopic) ligation
treat for size and symptoms, questionable effect on infertility

Fournier's gangrene

perianal/rectal abscess, urethral abscess
emergency wide debridement, possible urinary/fecal diversion; broad spectrum antibiotics
if missed 50% mortality

Penis

priapism: hi or lo flo
aspirate old blood, clots
intracavitary injection alpha adrenergic agent

surgery: fistula, shunt
treat underlying cause, eg. sickle cell disease

phimosis: inability to retract foreskin
usually not emergency
if need to catheterize circumcise or do dorsal slit

paraphimosis
more emergent, trap glans, ischemia
dorsal slit, circumcision under penile block

Impotence

most from organic causes: vascular, diabetes, trauma, venous leak, hypertension, smoking, post prostatectomy

IMA ligation risk injuring sympathetics, impair ejaculation

N. eregentes parasympathetic(T12-L2) (erection) and sympathetic (S2-4)(ejaculation)

hormonal testing (testosterone, prolactin, LH, FSH) not done anymore since Viagra

meds: viagra, levitra, cialis: work through nitric oxide effect on smooth muscle of corpus cavernosum
prostaglandin urethral insert (alprostadil)
penile injection: caverject/tri-mix
vacuum erection pump
penile prosthesis (malleable/inflatable)

Colovesicle fistula

most common cause: diverticulitis (abscess decompresses into bladder leaving fistulous tract)
second cancer, third Crohn's

Dx cystoscopy: bullous edema