Urology in a Nutshell

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Topics To Be Reviewed

- Prostatic disease
  - Cancer and BPH
- Other common GU malignancies
  - Bladder, kidney, testicular
- Urolithiasis
- Erectile dysfunction

Topics Not To Be Reviewed

- Incontinence
- Pediatric/congenital urologic conditions
- Prostatitis and other UTI’s
- Neurogenic bladder
- Infertility
- GU Trauma

Prostate Function

- Secretes certain proteins into ejaculate necessary for normal fertility, PSA, PAP, and PSP
- Highest conc of zinc of any human tissue, possible role as anti-infective
- Does not promote the normal flow of urine

Prostate Pathology

- Benign Prostatic Hyperplasia (BPH)
- Prostate cancer
- Prostatitis
BPH

Consequences of BPH

- Lower Urinary Tract Symptoms (LUTS)
- Bleeding
- UTI's
- Bladder stones
- Urinary retention
- Obstructive uropathy

Differential Diagnosis

- **Prostate cancer**
  - Obstructive symptoms are late
  - PSA usually higher
  - May co-exist with BPH
- **Urethral stricture disease**
  - Hx of trauma, GC, or instrumentation
  - Main c/o is slow stream
  - Often younger

Differential Diagnosis

- **Primary bladder neck dysfunction**
  - No bulk obstruction
  - Often younger, type A personality
  - Bladder neck does not funnel on urodynamics
- **Neurogenic**
  - MS, DM, Parkinson's
- **Prostatitis**
  - Usually associated with pain

History

- **IPSS**
- **Duration of symptoms, acute vs. chronic**
- **Bleeding, stones, recurrent UTI's, renal insufficiency**
- **Hx of trauma or instrumentation**
- **Family hx**
- **Co-morbidities**

Physical Examination

- **Focused neurological**
- **DRE**
Work-up

- Urinalysis
  - To r/o bladder cancer and UTI
- PSA
  - In pts with > 10 yr life expectancy and the presence of ca prostate would change their tx
- Optional
  - Urine cytology, flow rate, post-void residual, urodynamics, cystoscopy, prostate u/s

Treatment Options

- Watchful waiting (for mild symptoms)
- Medical Therapy
  - Alpha-adrenergic antagonists
  - 5 Alpha-reductase inhibitors
- Phytotherapy
  - Saw Palmetto

Minimally Invasive Therapy
- Microwave
- TUNA
- Urolume stent

Surgical Treatments
- TURP
- TUIP
- Photovaporization
- Open prostatectomy

BPH Medical Therapy

BPH Medical Therapy
BPH – Medical Therapy

- All alpha blockers have similar efficacy
- Tamsulosin and alfuzosin have less orthostasis
- Tamsulosin may have more retrograde ejaculation
- Alpha blockers should not be used to treat both BPH and hypertension as sole therapy

ALLHAT Group, JAMA, 283:1967, 2000

BPH – Medical Therapy

- 5 alpha reductase inhibitors are indicated for men with LUTS and prostate enlargement
- Partially effective in relieving symptoms
- Reduces the risk of urinary retention and BPH related surgery
- Reversible risk of decreased libido and ED

PLESS Group, NEJM

MTOPS Trial

- Randomized men with LUTS to doxazosin alone, finasteride alone, combination therapy or observation
- Combination proved best in terms of reducing progression
- Only the arms with finasteride reduced risk of retention or BPH related surgery

MTOPS group, J Urol, 167: 1042, 2002

Saw Palmetto

-Serenoa repens extract of dwarf palm tree
-Prospective randomized trials are rare
-One study did show a statistically significant difference in IPSS -4.4 vs. -2.2
-But no difference in flow rate, PSA, prostate size


Minimally Invasive Therapy

Thermal-based Therapy

- Microwave, radio frequency, high intensity ultrasound, hot water, interstitial laser
- Heating the prostate to >45°C causes coagulation necrosis
- Effective in partially relieving symptoms
- Prostatron®, Targis®, CoreThermTM, ThermatrixTM

TARGIS®
Surgical Therapies

- TURP
- Open prostatectomy
- Photovaporization

TURP

- Gold standard for urinary retention and severe LUTS
- Hospital stay and anesthesia required
- Risk of incontinence, bleeding, TUR syndrome, bladder neck contracture
- Almost all have retrograde ejaculation

Open Prostatectomy

- For glands > 80 cc, avoids risk of TUR syndrome
- Requires an incision, longer hospital stay, greater risk of transfusion
- Probably more durable than TUR

Photovaporization Of The Prostate

Prostate Cancer

- 230,110 new cancers expected this year
- 29,900 deaths

Jemal et al, CA Cancer J Clin, 54: 8, 2004

Prostate Cancer Diagnosis

- PSA
- DRE
- Detection rates are highest with a combination of PSA and DRE
- Transrectal Ultrasound (TRUS) used to systematically biopsy the prostate but not a screening tool by itself
- Watch for new power Doppler with contrast
Does Screening Reduce Prostate Ca Mortality?

- Incidence of death from ca prostate is declining: 40,400 in '95 to 30, 200 in ‘02
- Clinical and pathologic stage is also improved
- Randomized trials in Europe and US pending
- No randomized trial for pap smears in cervical cancer

Sensitivity Of PSA

- Difficult to know with certainty
- Increasing sensitivity results in decreasing specificity
- If 4.0 is cutoff, about 80% sensitive;20% of tumors have PSA 2.5-4

Age-specific PSA

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Free-to-total PSA

- PSA Circulates in free and complexed forms
- CaP is associated with less free
- PSA in 4-10 range: %free < 10 increased yield to 56%, while %free >25, +bx rate = 8%
- Different assays may result in different levels

PSA Velocity

- Change in PSA over time
- .75ng/ml/yr associated with increased risk of ca
- Archived samples, homogenous population, long-term f/u
- Not reproducible in short-term due to biologic and analytic variability

Prostate Cancer Staging

- Bone scans reserved for PSA >10, Gleason >7, local stage >T2
- MRI Spectroscopy may offer advantages with local staging over any previous techniques
**MRI Spectroscopy**

**Prostate CA Treatment Options**
- Watchful waiting
- Hormonal ablation
- External Beam Radiation
- Brachytherapy
- Radical Prostatectomy
- Cryoablation

**Watchful Waiting**
- 695 men randomized to observation vs. radical prostatectomy
- At 6.2 yrs f/u statistically significant difference in metastasis free survival
- Overall survival not significant (yet)
- PIVOT results pending

Holmberg L et al. NEJM, 347:781, 2002

**Radical Prostatectomy**
- 3-4 hrs in OR
- 3-4 days in hospital
- 1-2 weeks with Foley cath
- 3-4 weeks to full pre-surgical activity level
- Laparoscopic robotic approach is growing

**Radical Prostatectomy Complications**
- Life threatening complications like PE 1%
- Operative mortality .3%
- Incontinence <10% to 30%
- Erectile dysfunction 35% to 70% after attempt at nerve-sparing

**Radiation Therapy**
- External beam
- Brachytherapy
- Combination
- Hormonal ablation as adjunct
Cryotherapy

- Using transrectal ultrasound, cryotherapy probes are advanced into the prostate through the perineum.
- A combination of freezing and thawing provides cell death through bursting
- Biochemical failure rates between 14 and 69%
- Precise role has not been determined

Bladder CA

- Fifth most common adult cancer
- 57,400 new cases and 12,500 deaths in 2003
- Disease of industrialization
- Cigarette use, industrial carcinogens and schistosomiasis account for 80% of cases

Bladder CA: Molecular Factors

- RAS, MYC, and EGFR overexpression
- RB mutations
- P53 mutation correlate with progression of disease

Histology

- Transitional cell 90%
- Squamous cell 5%
- Adenocarcinoma
- Small cell, Rhabdomyosarcoma

Staging
Clinical Features

- Hematuria 80%
- Urgency and Irritative symptoms 20%

Bladder CA Work-Up

- Cystoscopy
- Upper Tract Imaging
- Urinary Cytology
- CT scan or MRI for Invasive Disease

Bladder CA Treatment

- TURBT – transurethral resection of bladder tumor
- Intravesicle chemo or immune therapy with BCG
- Radical cystectomy for invasive disease
- Partial cystectomy for small volume invasive disease
- Bladder preservation with chemo and XRT

Urinary Diversion after Radical Cystectomy

- Ileal conduit
- Neo-bladder
- Continent catheterizable pouch

Renal Masses and CA

- Incidental
- Hematuria
- Flank Pain

Hematuria

- Normal individual excrete 1-2 million RBC’s/24 hours
- 97% of healthy patients <5RBC/hpf of spun sediment
- Work-up for >5RBC on at least 2 u/a’s
- Gross hematuria
History and Physical

- Pain
- Fever
- Trauma
- Family History
- Occupational Exposure

History and Physical

- Abdominal or Flank Mass
- Varicocele
- Adenopathy

Diagnostic Studies

- Upper Tract Imaging-IVP, sono or CT
- MRI with/without Gado
- Cystoscopy to rule out bladder lesion

Renal Cysts

- Simple cysts
- Indeterminate cysts
- Cystic neoplasm

Benign Tumors

- Oncocytoma—cannot be distinguished clinically from renal cell
- Angiomyolipoma (AML)
  - Hamartoma consisting of blood vessels, smooth muscle and fat
  - Associated with tuberous sclerosis
  - Tend to bleed and require intervention when >4cm

Malignant Renal Tumors

- Renal Cell CA
- Transitional Cell
- Sarcoma
- Wilms
- Lymphoma
- Metastatic tumor
Renal Cell CA
Clinical Features
- Classic triad
  - Flank pain, palpable mass, and hematuria
- Solid enhancing lesion on CT or MRI
- Paraneoplastic syndromes

Renal Cell CA
Treatment
- Radical Nephrectomy, open or laparoscopic
- Partial Nephrectomy
- Cryoablation
- Immune therapy
  - IL-2, interferon
- On the horizon
  - Cell cycle inhibitors, multi-kinase inhibitors

Testis Cancer
- About 7500 new cases and 300 deaths per year
- Most common solid tumor of young men

Testis CA
Pathophysiology
- 95% arise from germ cells
- Most common is seminoma
- Non-seminomatous tumors
  - Embryonal
  - Teratoma
  - Choriocarcinoma
  - Yolk Sac

Testis CA
Risk Factors
- 10% cases are in pts with hx of cryptorchidism
- 15-20% of those are in the contralateral testicle

Testis CA
Differential Diagnosis
- Hydrocele
- Spermatocele
- Hernia
- Paratesticular tumor
Testis CA
History and Physical
- Painless (usually) Swelling
- Weight loss or back pain may signal spread
- Hx of orchidopexy
- Solid mass in testis on exam
- Adenopathy

Testis CA
Diagnostic Studies
- +U/A may indicate epididymitis
- Serum markers
  - AFP
  - ßHCG
  - LDH

Testis CA
Diagnostic Studies
- Scrotal sonogram to confirm solid nature and evaluate other testis
- Metastatic w/u includes cxr and abd/pelvic CT
- Trans-scrotal biopsy contra-indicated

Testis CA
Treatment
- 1st step is almost always radical orchiectomy
- Other treatment is stage and histology dependent and may involve abdominal irradiation, systemic chemotherapy or retroperitoneal node dissection

Urolithiasis
- Along with UTI's and prostate disease, among the most common urologic complaints
- May be asymptomatic or present as life-threatening emergency

Urolithiasis
- Stone formation based on supersaturation
  - Urinary pH, ionic strength, solute concentration, and complexation
- Crystal formation involves nucleation, growth and aggregation
**Urolithiasis**

- Calcium stones
  - Absorptive, resorptive, renal leak
  - Hyperuricosuric, hyperoxaluric, hypocitraturic
- Struvite-magnesium, ammonium and phosphate
  - Urea splitters: Proteus, Pseudomonas, Providencia, Klebsiella, Staphylococci, and Mycoplasma
- Uric acid
- Cystine

**Renal Colic**

- Acute flank pain may radiate to the groin, waxes and wanes and very severe
- Often accompanied by nausea and vomiting
- Fever implies some associated UTI
- Urinary frequency may imply a very distal stone

**Differential Diagnosis**

- Cholecystitis
- Appendicitis
- PID
- Diverticulitis
- AAA
- Bowel obstruction
- Musculoskeletal sprains/spasms
- Zoster

**Diagnostic Evaluation**

- U/A and culture
- Renal colic CT
- KUB
- Sonogram in pregnancy

**Management**

- Treat associated infection
- Hydration and pain control
- Retrograde stent or percutaneous nephrostomy
- Extracorporeal shockwave lithotripsy (ESWL)
- Ureteroscopy with laser lithotripsy
- Percutaneous nephrolithotomy
- Open stone procedures

**Indications for Urgent Treatment**

- Solitary kidney
- Acute renal insufficiency
- UTI with fever
- Pain or vomiting unresponsive to conservative management
Erectile Dysfunction

- Anatomy and Physiology
- Diagnosis and Evaluation
- Treatment

Erectile Dysfunction

- Endocrine
- Vascular
- Nervous system
- Brain
  - “The brain is the most important sexual organ”
    - Freud

Erectile Dysfunction

- The persistent inability to achieve an erection that is satisfactory for sexual activity

Erectile Dysfunction

Anatomy

- Corpora Cavernosa

Erectile Dysfunction

Evaluation

- History
  - Sexual
  - Medical
- Physical examination
- Laboratory testing
**Erectile Dysfunction**

**Sexual History**
- Loss of libido
- Painful or bent erections
- Morning erections
- Premature ejaculation
- Onset and duration of difficulties with ED

**Erectile Dysfunction**

**Medical History**
- Diabetes: 27-59%
- Chronic renal failure: 40%
- Hepatic failure: 25-70%
- Multiple sclerosis: 71%
- Depression: 90%
- Vascular disease is cause in 50%

**Erectile Dysfunction**

**Medical History**
- Spinal cord injury
- Pelvic surgery and radiation
- Medications: beta-blockers, thiazides, ACE inhibitors, Calcium channel blockers, digoxin, hormonal therapies
- Smoking magnifies effects of other risk factors
- Alcohol abuse

**Erectile Dysfunction**

**Physical Exam**
- Focused exam
- Vascular system: pulses
- Neuro exam
- Rectal exam if indicated

**Erectile Dysfunction**

**Laboratory Evaluation**
- Morning testosterone
- If abnormal, proceed with LH, FSH, prolactin
- Basic chemistry, lipid panel, liver function
- Thyroid function if indicated
- PSA if indicated

**Erectile Dysfunction**

**Treatment**
- Treat specific cause when one is identified
  - Depression, hypogonadism, hypothyroid
- Lifestyle changes
- In no specific cause is found, provide patient with options to improve erectile function
  - Oral medications
  - Intraurethral and intracavernosal drugs
  - Vacuum device
  - Prosthesis
Erectile Dysfunction
PDE –5 Inhibitors
- Sildenafil (Viagra®), Tadalafil (Cialis®), Vardenafil (Levitra®)
- Effects of Cialis® may last 24-36 hours
- All work by inhibiting breakdown of cGMP
- Do not cause erections without stimulation
- Do not improve libido directly

Erectile Dysfunction
PDE –5 Inhibitors: Contraindications
- Any nitrate containing compound-NTG, Isosorbide, Amyl nitrate: absolute contraindication
- Should not use Levitra® or Cialis® with alpha-blockers although Flomax® ok with Cialis®

Erectile Dysfunction
Treatment
- Transurethral Alprostadil (MUSE®)
- Intracavernosal Injections Alprostadil (Caverject®, Edex®), papaverine, phentolamine
- Risk of priapism is increased over other treatments

MUSE

Erectile Dysfunction
Vacuum device

Penile Prosthesis
Penile Prosthesis

- Malleable or inflatable
- High patient satisfaction rate
- Low morbidity
- Irreversible
- May have to be removed for infections or mechanical malfunction