Urinary Incontinence, BPH and Voiding Dysfunction

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Definitions and Types

• Stress urinary incontinence: Involuntary leakage of urine with activity (coughing, sneezing, laughing, lifting heavy objects)

• Urgency: A sudden compelling need to void that is difficult to defer

• Urge urinary incontinence: Involuntary leakage of urine with accompanied by or immediately preceded by urgency

• Frequency: Increased number (>8) of voids during waking hours

• Nocturia: One or more voids that interrupt a night's sleep

Prevalence

• Urinary incontinence affects 15-50% of women of all ages (overall prevalence 38%)

• An estimated 11% of women will have undergone at least 1 prolapse surgery by age 80


The Aging Urinary Tract
### History

- **Duration of symptoms**
- **Degree of incontinence (number of pads or diapers)**
- **Degree of bother**
- **Always important to look for and exclude significant urinary tract pathology**
  - Infection
  - Blood in urine (hematuria)

### Physical Exam

- **Neurologic exam**
- **Digital rectal exam**
  - Prostate enlargement (BPH) or suspicious findings for cancer
- **Female pelvic exam**
  - Prolapsed bladder or urethral mass
  - Visible incontinence with coughing or straining

### History

- **Medications**
  - Diuretics

- **Fluid intake**
  - Total fluid intake
  - Caffeine and soda use

### Laboratory Evaluation

- **Urinalysis**
- **Urine culture and sensitivity**
- **Urine cytology**
- **BUN, Creatinine**
- **Prostate specific antigen (PSA) – consider referral for:**
  - Two consecutive levels above 4.0 ng/dL or any >10 ng/dL without setting of acute urinary retention
  - Enlarged prostate on exam with baseline PSA >1.6 AND urinary symptoms
### Radiography
- Usually of little help in assessment of incontinence or voiding dysfunction
- Renal imaging if patient has:
  - Associated flank pain
  - Hematuria
  - New onset renal insufficiency
- Ultrasonography or CT scan
  - Bladder ultrasound pre-/post-void

### Benign Prostatic Hyperplasia (BPH)
- Non-invasive uroflowmetry
  - Pressure-flow studies in select cases
- Post-void residual (PVR)
  - Bladder scan
  - Straight catheterization

### Benign Prostatic Hyperplasia (BPH)
- Histologic diagnosis
  - Clinical finding on digital rectal exam is benign prostatic enlargement (BPE)
- AUA Symptom Score (IPSS)
  - Bother score

### Medical Management
- Alpha-blocker therapy
  - Tamsulosin (Flomax): 0.4 mg daily
  - Alfuzosin (Uroxatral): 10 mg daily
  - Side effects: nasal congestion, orthostatic hypotension, decreased ejaculate
  - Avoid PDE-5 inhibitors (Viagra, etc) within 6 hrs
Medical Management

- **5-α-reductase Inhibitors**
  - Finasteride (Proscar): 5 mg daily
  - Dutasteride (Avodart): 0.5 mg daily
  - **Side effects**: Hair growth, decreased libido

- **Herbal therapy**
  - Saw palmetto

Behavioral Modification

- **Fluid restriction**
  - 64 fluid ounces total (mostly water)

- **Diuretic use**
  - Timing (mid-day vs evening or AM dosing)

- **Caffeine intake**

- **Timed Voiding**

Treatment of Urgency, Frequency and Urge Urinary Incontinence

Non-Invasive Options
### Medical Management

**Anticholinergic Therapy**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage</th>
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<tr>
<td>Detrol, Detrol LA (tolterodine)</td>
<td>2 or 4 mg daily</td>
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<tr>
<td>Oxytrol (oxybutynin transdermal system)</td>
<td>3.9 mg twice weekly</td>
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</table>

### More Antimuscarinic Agents

- **Ditropan XL (oxybutynin):** 5 mg, titrate up to 30 mg daily
- **Vesicare (solifenacin):** 5-10 mg once daily
- **Enablex (darfenacin):** 7.5-15 mg once daily
- **Sanctura (trosipm chloride):** 20 mg twice daily, once daily (Sanctura XR) available in February 2008

### Caveats of Drug Therapy

- **May take 3-4 weeks to see full effect (>50% symptom improvement)**
- **Contraindications:** urinary retention, narrow angle glaucoma, gastroparesis
- **Watch for side effects**
  - Dry mouth
  - Constipation
  - Worsening dementia (elderly)
- **Consider referral if symptoms not improved after 1-2 different anticholinergic medications**

### Other Pharmacology

- **Amitriptyline (Elavil):** 10-25 mg qhs
- **Imipramine (Tofranil):** 75 mg qhs
- **Phenazopyridine (Pyridium):** 100-200 mg tid x 3-4 days
<table>
<thead>
<tr>
<th>Sacral Neuromodulation (InterStim™)</th>
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<tbody>
<tr>
<td>• FDA-approved 1997 for treatment of:</td>
</tr>
<tr>
<td>✓ Chronic urgency and frequency</td>
</tr>
<tr>
<td>✓ Refractory urge urinary incontinence</td>
</tr>
<tr>
<td>✓ Non-obstructive urinary retention</td>
</tr>
<tr>
<td>• Temporary placement of electrode in one (or occasionally both) S3 nerve roots</td>
</tr>
<tr>
<td>• 2-3 week “test phase”</td>
</tr>
<tr>
<td>✓ Implantable generator (“pacemaker”) if &gt;50% subjective and objective improvement</td>
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<thead>
<tr>
<th>Treatment of Stress Urinary Incontinence</th>
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<tr>
<td><img src="image" alt="Image of woman lifting weights" /></td>
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<tr>
<th>Neuromodulator Devices</th>
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<tr>
<td><img src="image" alt="Image of electrode placement" /></td>
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<thead>
<tr>
<th>Pelvic Floor Physical Therapy</th>
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<tbody>
<tr>
<td>• Non-invasive means of improving pelvic floor muscles (Kegel exercises)</td>
</tr>
<tr>
<td>• Often very successful in addressing mild incontinence in motivated and active women</td>
</tr>
<tr>
<td>• Need specialized pelvic floor therapy referral</td>
</tr>
</tbody>
</table>
BULKING AGENTS / INJECTION THERAPY

Transurethral needle passage
- Collagen (Contigen)
- DuraspHERE
- Coaptite
- Macroplastique

Summary

- Always investigate for signs of more significant genitourinary pathology
- Empiric course of medical therapy and/or behavioral modification in idiopathic cases
- Referral to specialist if no response to first line therapy or other pathology detected

Surgical Management

- Bladder neck suspension
- Sling urethropexy
- Artificial Urinary Sphincter

☑ Designed for male incontinence secondary to post-prostate surgery

Diagnosis and Management of Renal Calculi: Update for 2008

Bodo E. Knudsen, MD FRCSC
Director, OSU Comprehensive Kidney Stone Program
Assistant Professor, Department of Urology
## Overview

| • Initial presentation |
| • Imaging options |
| • Treatment |
| ✓ Watchful waiting |
| ✓ Surgical options |

## Types of Stones

| • Calcium oxalate or phosphate – 70-80% |
| • Uric acid – 5-10% |
| • Struvite – 5-15% |
| • Cystine – 1% |
| • Other (xanthine, drug related) |

## Introduction

| • 5-15% of population develop renal calculi |
| • Recurrent rate ≈ 50% |
| • Primary care and specialists involved in ca |

## Initial Evaluation

| • Complete medical history and physical exam |
| ✓ Severe flank pain; may radiate to groin |
| ✓ Nausea and vomiting |
| ✓ Lower urinary tract symptoms |
Initial Evaluation

• Identify comorbidities
  ✓ Immunosuppressed
  ✓ Pregnant
  ✓ Solitary kidney
  ✓ Renal insufficiency

Initial Evaluation

• Urinalysis
  ✓ Microhematuria
  ✓ Nitrites/bacteria and/or leucocytes
  ✓ Hexagonal crystals diagnostic of cystinuria
• CBC
• Electrolytes and Cr

Initial Evaluation

• Vitals
  ✓ Febrile?
• CVA tenderness
• Abdominal tenderness

Imaging Studies

• Unenhanced CT of abdomen and pelvis (CT stone study)
• IVP
• Ultrasound
Imaging – CT Scan

- New “gold standard”
- Fast, readily available
- Only secondary signs of obstruction
  - Perinephric stranding
  - Hydronephrosis
  - Rim sign

Imaging – CT Scan

- May identify other of pain (appendix, aneurysm, bowel problems, etc)
- Most stones visualized including uric acid
- Indinavir not visible

Imaging Studies - IVP

- Previous gold standard but carried risk of contrast reaction
- Useful for assessing obstruction
**Imaging Studies - IVP**

- Kidney stone
- Bladder

**Imaging Studies - Ultrasound**

**Indications of Acute Intervention**

- Intractable pain or nausea/vomiting
- Renal failure
- Obstruction in a solitary kidney or bilaterally
- Obstruction in a transplant kidney
- Fever or urosepsis

**Imaging Studies - Ultrasound**

- Limited role
- Pregnancy
- Uric acid lithiasis
- Follow up after surgery
Acute Intervention
• Urine culture
• Antibiotics
• Pain control
  ✓ Narcotics
  ✓ NSAIDS
  • Caution with renal insufficiency or history of GI bleed
• Ureteral stent or nephrostomy tube

Watchful Waiting
• Calculi ≤ 5 mm ≥ 50% chance they will pass spontaneously
✓ Factors to consider:
  • # of stones
  • Level of stone
  • History of prior spontaneous passage
  • Time frame (may take up to 6 weeks to pass)
  • Degree of obstruction

Treatment Options
1. Watchful waiting
   ✓ ± medical expulsion therapy
2. Shockwave lithotripsy
3. Ureteroscopy with laser lithotripsy
4. Percutaneous nephrolithotomy
5. Open stone surgery

Medical Expulsion Therapy
• Calcium channels blockers (nifedipine), corticosteroids, and alpha-blockers have been used
• Best evidence currently for alpha-blockers
  ✓ Tamsulosin (Flomax) 0.4 mg QD
• Improved pain control
• May also be used to after shockwave lithotripsy

Lithotomy Instruments of the 18th & 19th Centuries

Modern Stone Age

- Percutaneous approach (Johansson, 1976)
- ESWL (Chaussey, 1980)
- Intracorporeal Lithotripsy (Alken, 1978)
- Ureteroscopy (Perez-Castro, 1980)

Treatment of Upper Urinary Tract Calculi

Factors to Consider

- Stone size
- Location
- Composition (if known)
- Anatomic factors
- Failure of other therapies
- Renal function
**Shockwave Lithotripsy**

- Developed in early 1980’s by Dornier
- Shockwave generated extracorporeal (F1) and targeted to stone (F2)
- Stone fragments secondary to mechanical stresses and cavitation bubbles
- 1 – 2% risk of perinephric hematoma
- Risk of obstruction from fragments (Steinstrasse)
- Longterm effects??

**Storz Modulith SLX F2**

**Dornier HM-3**

**ESWL Contraindications 2007**

- Uncorrected Bleeding Diatheses
- Uncorrected Hypertension
- Febrile UTI
- Unfit for Anesthesia
- Morbid obesity
- Pregnancy
- Proximate Calcified Aneurysms
### Shockwave Lithotripsy

**Advantages:**
- Non-invasive
- Low complication rate
- Out-patient procedure
- Can be done under conscious IV sedation

**Limitations:**
- Lower stone-free rate

### Upper Tract Stones

**ESWL**

- Overall fragmentation rates – 60-80%
- Re-treatment rates are significant and machine dependent
- Ancillary treatment rates also high
- Patient still must pass fragments

### SWL: Complications

**Bleeding**
- Hematuria is universal
- Significant bleeding (perinephric or renal hematoma <1%)
  - Risk factors: bleeding disorders, hypertension, diabetes, obesity
**UTI/sepsis**
**Obstruction (Steinstrasse = “stone street”)**

**Rare**
- Pancreatitis
- Bowel injury
- Pulmonary contusion
- Hematospermia
- Spleen/liver injury
ESWL Linked to Diabetes?

- Retrospective study at Mayo Clinic
- 630 patients treated in 1985 with HM3
- 45.7% completed questionnaire
- Increase in hypertension and diabetes mellitus in ESWL versus control group

Krambeck et al., J Urol 2006

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Despite the reduction in contraindications to ESWL, is it the best therapeutic modality?

Krambeck et al., J Urol 2006

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ESWL Linked to Diabetes?

- But...
- Control groups not comparable
- No difference between left and right sided treatments
- HM3 not widely used at present

Krambeck et al., J Urol 2006

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Upper Tract Stones

Treatment Mode

1) Spontaneous Passage
2) ESWL
3) Ureteroscopy
4) PCNL
5) Open Surgery
**Ureteroscopy and Laser Lithotripsy**

- Retrograde endoscopy of urinary tract
- Stones fragmented with holmium: YAG laser
- Fragments often removed thereby improving stone-free rate
- Often requires double-J stent
- Expanding role in pregnancy, bleeding disorders, obesity, and complex stone disease

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**Flexible Ureteroscopy Expanding Role**

- Primary therapy for proximal ureteral stones > 1 cm
- Calyceal diverticular stones
- Obese patients
- Bleeding diatheses
- ESWL failures
- Cystine stones

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**Semi-rigid Ureteroscopes**

- No balloon dilation
- ↓ stent use
- Less traumatic
- Used for calculi in:
  - distal ureter

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**Active Secondary Deflection**
Secondary deflection into lower pole calyx

<table>
<thead>
<tr>
<th>Technique of Laser Lithotripsy</th>
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<tbody>
<tr>
<td>• Laser fiber abutted against the stone</td>
</tr>
<tr>
<td>• Initial laser settings:</td>
</tr>
<tr>
<td>✓ 0.8 – 1.0 J/pulse</td>
</tr>
<tr>
<td>✓ 8 - 25 Hz</td>
</tr>
<tr>
<td>• Pulse frequency increased gradually as necessary</td>
</tr>
</tbody>
</table>

Flexible Ureteroscopy for Lower Pole Calculi
Results

<table>
<thead>
<tr>
<th>Series</th>
<th>Pts</th>
<th>Mean Stone Size (mm)</th>
<th>Stone-Free</th>
<th>Fragments &lt;4mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bagley, 1999</td>
<td>23</td>
<td>7 (3-18)</td>
<td>87%</td>
<td>13%</td>
</tr>
<tr>
<td>Grasso, 1999</td>
<td>79</td>
<td>5 to &gt;20</td>
<td>76%</td>
<td>8%</td>
</tr>
<tr>
<td>Hollenbeck, 2001</td>
<td>60</td>
<td>9</td>
<td>88%</td>
<td>NS</td>
</tr>
<tr>
<td>Kourambas, 2001</td>
<td>34</td>
<td>5-20</td>
<td>85%</td>
<td>15%</td>
</tr>
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</table>

Ureteroscopy: Complications

• UTI/sepsis
• Ureteral perforation
• Ureteral avulsion
• Retained stone fragments
• Ureteral stricture
Percutaneous Nephrolithotomy - PCNL

- Larger, rigid instruments used to fragment and remove calculi
- More invasive than URS or SWL, but much less than open surgery
- Treatment of choice for large stones
- Expanding role for lower pole calculi

Indications for PCNL

- Large stone volume (> 2cm)
- Staghorn calculi
- Cystine composition
- Associated distal obstruction (UPJO, Tic, etc)
- Renal anomalies (horseshoe, pelvic)
- Morbidly obese or orthopedic condition
- Certainty of result (Aviators, Struvite)
- Other modality failure

Treatment of Staghorn Calculi
PCNL: Complications

- Infection/sepsis
- Bleeding
  - Requiring transfusion < 2%
- Bowel injury
- Hydro/pneumothorax
- AVM
<table>
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<tr>
<th>Open Stone Surgery</th>
<th>Metabolic Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Very few indications today</td>
<td>• First time stone former</td>
</tr>
<tr>
<td>✓ Complete staghorn renal calculus</td>
<td>✓ Simple evaluation</td>
</tr>
<tr>
<td>✓ with infundibular stenoses</td>
<td>• Complicated stone patient</td>
</tr>
<tr>
<td>✓ Impacted ureteral stone and</td>
<td>✓ Comprehensive evaluation</td>
</tr>
<tr>
<td>ureteral stricture</td>
<td></td>
</tr>
<tr>
<td>✓ Surgeon preference</td>
<td></td>
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<table>
<thead>
<tr>
<th>Metabolic Evaluation</th>
<th>Metabolic Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>• First time stone formers:</td>
<td>• First time stone formers:</td>
</tr>
<tr>
<td>✓ CBC, Lytes, Cr, Ca</td>
<td>✓ CBC, Lytes, Cr, Ca</td>
</tr>
<tr>
<td>✓ PTH if Ca abnormal</td>
<td>✓ PTH if Ca abnormal</td>
</tr>
<tr>
<td>✓ Stone analysis</td>
<td>✓ Stone analysis</td>
</tr>
<tr>
<td>✓ Increase fluid intake to &gt; 2L per day</td>
<td>✓ Increase fluid intake to &gt; 2L per day</td>
</tr>
<tr>
<td>✓ Limit salt intake</td>
<td>✓ Limit salt intake</td>
</tr>
<tr>
<td>✓ Limit animal protein to &lt; 12 ounces daily (portion control)</td>
<td>✓ Limit animal protein to &lt; 12 ounces daily (portion control)</td>
</tr>
<tr>
<td>✓ Some calcium</td>
<td>✓ Some calcium</td>
</tr>
<tr>
<td>✓ Limit oxalate</td>
<td>✓ Limit oxalate</td>
</tr>
</tbody>
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Surgery for Stones

Today, the overall rate of open stone surgery should be no greater than 1% or less
### Indications for Comprehensive Metabolic Evaluation

- Family history
- \( \leq 18 \) years of age
- Uric acid, cystine, or calcium phosphate (brushite) stones
- Bilateral stone disease
- Inflammatory bowel disease, chronic diarrhea

### Comprehensive Evaluation

- Stone analysis
- 24 hour urines x 2
  - Volume, pH, calcium, oxalate, citrate, uric acid, phosphate, sodium, potassium, magnesium, ammonium, chloride, sulfate, and creatinine

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<thead>
<tr>
<th>Indications for Comprehensive Metabolic Evaluation</th>
<th>Comprehensive Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of bariatric surgery</td>
<td>Serum calcium, bicarbonate, creatinine, chloride, potassium, magnesium, phosphate, BUN, PTH, 1,25 dihydroxyvitamin D and creatinine</td>
</tr>
<tr>
<td>Gout</td>
<td>Cystine stone formers – 24hr quantitative cystine</td>
</tr>
<tr>
<td>Nephrocalcinosis</td>
<td></td>
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<tr>
<td>Osteoporosis or pathological fractures</td>
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