Lower Urinary Tract Symptoms in Aging Men

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Case 1

• 56 year old gentleman, otherwise healthy, seeks advice regarding his LUTS.

• In the last 6 months he has noticed more frequency and urgency. He denies urge incontinence. Feels his stream has not changed.

• PMH is significant for hyperlipidemia and borderline hypertension
Prostate Exam

- Prostate is non nodular, non tender
- Prostate is measured to be 4 x 4.5 cm

Epidemiology

- Urologic Diseases in America BPH project suggests: Progressive increase in prevalence of moderate-to-severe LUTS, rising to nearly 50% by the eight decade
- Risk of AUR rises from baseline of 6.8/1000 to 34.7/1000 by age 70 and older
- 90% of men have some type of LUTS between 45-80 years of age
Epidemiologic Implications

• Urgent need to:
  – Increase awareness and social acceptance
  – Educate physicians and population at risk
  – Implement public campaigns to diminish social stigma
  – Improve evaluation, prevention and management of LUTS
LUTS/BOO Clinical Significance

- Not often life threatening condition, but may have significant impact on QoL.
- QoL or the degree of bother → Motivation for seeking help

- Reason for treatment:
  - QoL issues
  - Avoid disease progression
  - Prevent complications
  - Maintain “Bladder health”

LUTS Subgroups

- Obstruction-induced detrusor changes (Storage symptoms)
  - Frequency
  - Urgency
  - Nocturia

- Increased Urethral resistance (voiding symptoms)
  - Hesitancy
  - Slow stream
  - Intermittency

Post micturition LUTS
- Incomplete Emptying
- Post micturition Dribbling

• Not all urinary symptoms are due to benign causes
LUTS Pathophysiology

- The urothelium Based Hypothesis
  - Urothelial receptors, neurotransmitter, suburothelial interstitial cell network and nerve fibers

- The myogenic hypothesis
  - Excitability of smooth muscle cells

- The Neurogenic Hypothesis
  - Reduced peripheral or Central Inhibition, C-Fibers

- α-adrenoceptors
- β-adrenoceptors
- Cannabinoid receptors (CB1)
- P2X
- P2Y
- TRPV1
- Muscarinic receptors (M3 and M2)
- NO

- M3-M2 Receptors
- PGE2
- Tyrosine Kinase Receptor protein
LUTS Pathophysiology

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- The Neurogenic Hypothesis
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- C Fibre reflexes
- Nerve Growth Factors
- Tyrosine Kinase Receptor protein

Aging Bladder
(Pathophysiology is less clear)

- Atherosclerosis – Ischemia – Fibrosis
  - Smooth muscle atrophy
  - Decreased compliance (TGF-B1
  - Urothelial damage – increased permeability – irritation of underlying tissue

Roosen et. al, European Urology 56 (2009)

Life Style

Exercise

Weight Gain

Obesity

LUTS Evaluation

- Identify the cause

- Rule out:
  - Cancer
  - Infection
  - Urolithiasis

- Identify contributing factors:
  - Diabetes mellitus
  - Cardiovascular disease
  - Kidney disease
  - Neurologic disorders (CVA, Parkinson’s disease or dementia)
  - Sleep disorder
LUTS Evaluation

• H & P (DRE)
  – BMI, Obesity?
  – Focused neurologic exam
  – Suprapubic distension, dullness in percussion
  – External Genitalia
  – Rectal exam
• AUASI/IPSS questionnaire
• U/A
• Serum
  – Creatinine?
  – PSA
◆ Optional:
  – Ultrasound estimate of post void residual volume (PVR)
  – Flow Rate Recording

If Nocturia → voiding diary. (nocturnal polyuria: >33% of the 24 hr urine output. >3 L/24h → Polyuria)

AUA-7 Symptom Index for Benign Prostatic Hyperplasia

<table>
<thead>
<tr>
<th>Question</th>
<th>Not at All</th>
<th>Less Than 1 Time in 5</th>
<th>Less Than Half the Time</th>
<th>About Half the Time</th>
<th>More Than Half the Time</th>
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<tbody>
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<td>0</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>2. Over the past month, how often have you had to urinate again less than 2 hours after you finished urinating?</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>3. Over the past month, how often have you found you stopped and started again several times when you urinated?</td>
<td>0</td>
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<td>0</td>
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</tr>
<tr>
<td>4. Over the past month, how often have you found it difficult to postpone urination?</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>5. Over the past month, how many times did you push or strain to begin urination?</td>
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<td>0</td>
<td>0</td>
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<td>6. Over the past month, how often have you had to push or strain to empty your bladder completely?</td>
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<td>0</td>
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<td>7. Over the past month, how many times did you most typically get up to urinate from the time you went to bed at night until the time you got up in the morning?</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Bladder Emptying
Frequency
Intermittency
Urgency
Decreased flow
Straining
Nocturia

AUA Symptom Score = sum of questions A1 – A7 =

<table>
<thead>
<tr>
<th>Quality of life due to urinary symptoms</th>
<th>Delighted</th>
<th>Pleased</th>
<th>Mostly Satisfied</th>
<th>Mixed</th>
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</tr>
</thead>
<tbody>
<tr>
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<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>
LUTS Evaluation

- Pressure Flow Studies
  - Bladder dysfunction and/or outlet obstruction
  - Detrusor underactivity vs. outlet obstruction
- Prostate Imaging with Transabdominal or Transrectal Ultrasound
  - If treatment depends on prostate size and shape
- Upper Urinary Tract Imaging with Ultrasonography
  - Renal insufficiency
  - UTI
  - Hematuria
  - High PVR
- Endoscopy of Lower Urinary Tract
  - Hematuria
  - Plan for non-medical intervention

LUTS Evaluation
(Not in the Guideline but has significant clinical application)

- Aimed to improve predictibility of
  - disease progression
  - Response to medication
  - Need for surgical intervention
- Prostate Volume
- Resistive index of prostate capsular artery (Doppler)
- Bladder Wall Thickness and Bladder Weight
- Near Infrared Spectroscopy (NIRS)
- Intravesical Prostatic Protrusion (IPP)
- Bio-Markers
**BPH Related Bio-Markers**

<table>
<thead>
<tr>
<th>Assay/Diagnosis</th>
<th>Reference</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prostate specific antigen (PSA)</td>
<td>[4-36]</td>
<td>Even though prostate specific antigen (PSA) is a good marker of BPH, it is not sensitive to the degree of prostate enlargement.</td>
</tr>
<tr>
<td>PSA</td>
<td>[41, 44]</td>
<td>Higher level of serum PSA is correlated with the risk of BPH and is a risk factor for prostate cancer.</td>
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<td>Prostate specific antigen (PSA)</td>
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**LUTS Evaluation**
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  - Disease progression
  - Response to medication
  - Need for surgical intervention

- **Prostate Volume**
- **Resistive index of prostate capsular artery (Doppler)**
- **Bladder Wall Thickness and Bladder Weight**
- **Near Infrared Spectroscopy (NIRS)**
- **Intravesical Prostatic Protrusion (IPP)**
- **Temporary Urethral Stents**
- **Bio-Markers**
Predictors of retention/need for procedure

- **Prostate Size**
  - The larger the prostate, the greater the risk
  - (PSA 3.3 5% risk, PSA 1.3 2% annual risk)

- MTOPS Placebo Arm:
  - Overall progression: 17%
  - Annual progression: 4.5%
  - Larger Prostate (>31 cc)
  - Lower Maximum flow (<10ml/sec)
  - Age: >62

Intravesical Prostatic Protrusion
(Bladder volume 100-200ml)

<table>
<thead>
<tr>
<th>Grade I: &lt;5 mm</th>
<th>Grade II: 5-10</th>
<th>Grade III: &gt;10 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>21% obstructed</td>
<td>94% obstructed</td>
<td>67% failed void trial post AUR</td>
</tr>
<tr>
<td>31% failed void trial post AUR</td>
<td>67% failed void trial post AUR</td>
<td>7 fold more likely to progress with LUTS</td>
</tr>
</tbody>
</table>
Case 1 (continued)

- PVR: 10 cc
- Urinalysis: Unremarkable
- PSA: 1 ng/ml
- AUASI: 11/35, QoL score: 3/35
- IIEF-5 score: 19/25

- If the pt is not bothered → No evaluation will be initiated
Indications for urology referral at this stage:

- High Post void residual (>300 + severe LUTS)
- High PSA
- +RBCs in U/A
- Abnormal Prostate Exam

Treatment Options for BPH

- Watchful Waiting
- Medical Therapy
- Minimally Invasive Therapies
- Surgery (TURP / Laser)
Goals of Therapy
BPH/ LUTS

• Relieve “bothersome” symptoms to improve quality of life
• Prevent acute urinary retention
• Preserve bladder and renal function

Watchful Waiting
(VA Cooperative Study)

• Moderate symptoms
  – 10-15% get better
  – 10-20% get worse
  – Most remain stable
  – Severe Symptoms:
    • 20% improve
**What’s Wrong with Watchful Waiting**

(VA Cooperative Study)

- VA trial of TURP vs Watchful waiting 3-5 years
- Dutasteride vs Placebo 2 yrs with 2 year extension
- Patient who crossed over to TURP or Dutasteride 2 or more years later never achieved the same level of symptoms reduction as those who had treatment initially

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**Alpha Blockers**

Tamsulosin, Terazosin, Doxazosin, Alfuzosin, Silodosin

- Adrenoceptors on the bladder neck and the prostate
- The relaxation of the muscle tone
- Central actions
- $\alpha$-Blockers do not inhibit the growth or progression of BPH/LUTS
- Improvement of LUTS and not to reduce the risk of complications such as AUR or the need BPH-related surgery.
**Doxazosin**

- 8mg better than 4mg by 3.7 points
- 4 mg is not different that flomax 0.4mg
- In PREDICT study over one year: Doxazosin was better than placebo and finasteride (1.7-2.6)
- No different than combination therapy

- In MTOPS over 4 years: Doxazosin is better than finasteride by 1 point
- Worse than combination therapy by 1 point
- Generally well tolerated compared to tamsulosin
- Dizziness (4.4% vs 2.3%)
- Asthenia (0.8% vs 0.4%)

**Tamsulosin**

- Not much difference between 0.4-0.8mg
- Similar symptom response to Alfuzosin
- Generally well tolerated
- Ejac disorder: 3.2% vs 0.5% with Alfuzosin
**Tamsulosin**

- Intraoperative Floppy Iris Syndrome or IFIS (Chang 2005):
  - Progressive intraop miosis despite preop dilation.
  - Billowing of a flaccid iris
  - Posterior capsule rupture

- **IFIS**
  - Men with LUTS/BPH considered for alpha blockers therapy should be asked about planned cataract surgery
  - Men with planned cataract surgery should avoid the initiation of alpha blockers until after cataract surgery
  - In men with no planned cataract surgery, there are insufficient data to recommend stopping alpha blockers

**Choice of alpha blockers**

- Doxazosin and terazosin require dose titration and blood pressure monitoring, they are inexpensive, can be taken once daily, appear equally effective to tamsulosin and alfuzosin, and have generally similar side effect profiles.

- These agents do not appear to increase the risk of the IFIS, and doxazosin has demonstrated efficacy relative to placebo over four years of follow-up.

- These agents remain excellent choices for the management of bothersome LUTS attributed to BPH.
Case 1
2 m after starting Alfuzosin

- Significant improvement in his LUTS
- IPSS: 3/35 with QOL score of 1/6
- PVR: 5 cc

→ F/U annually with PSA and physical exam and PVR. Pt to continue alpha blockers.

Indications for urology referral at this stage:

- Persistence of LUTS, despite medical therapy
- Patient’s desire to seek other treatment options
- Side effects with medication
Case 2

- 65 year old retired teacher with LUTS
- He has had LUTS for more than 5 years, but thought it is normal, since his most of his friends have similar symptoms, as well.
- Recently, symptoms worsened to the point that it has affected his ADL’s.

### AUA-7 Symptom Index (Case 2)

<table>
<thead>
<tr>
<th>AUA Symptom Score = sum of questions A1–A7 = 21/35</th>
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<tr>
<td>1.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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</tr>
<tr>
<td>6.</td>
<td>None</td>
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<td>4</td>
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</tbody>
</table>
Case 2 (continued)

- PVR: 250 cc
- Urinalysis: Unremarkable
- PSA: 3ng/ml
- PMHx: HTN, CAD
- Hx of 50 pack year smoking

Case 2 (continued)

- PVR: 750 cc
- Urinalysis: Unremarkable
- PSA: 3ng/ml
- PMHx: HTN, CAD
- Hx of 50 pack year smoking
Case 2 (continued)

- PVR: 250 cc
- Urinalysis: Unremarkable
- PSA: 3ng/ml
- PMHx: HTN, CAD
- Hx of 50 pack year smoking

Case 2

Start an alpha blocker
(in men with hypertension and cardiac risk factors, Doxazosin monotherapy was associated with a higher incidence of CHF than seen with other antihypertensive agents.)
### AUA-7 Symptom Index (Case 1)

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<tr>
<td>3. Over the past month, how often have you found you stopped and started again several times when you were urinating?</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4. Over the past month, how often have you found it difficult to postpone urination?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5. Over the past month, how often have you had a weak urinary stream?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<td>6. Over the past month, how often have you had to push or strain to begin urination?</td>
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</tbody>
</table>

**AUA Symptom Score = sum of questions A1–A7 = 12/35**

**Quality of life score: 3/6**

### Case 2

**2 months after starting an alpha blocker:**

- Some improvement in his LUTS
- IPSS: 12/35 with QOL score of 3/6
- PVR: 55 cc

→ Addition of 5ARI (Finasteride, Dutasteride)?
→ Anticholinergics?
Anticholinergics

- **Option:**
  - Appropriate alternative for the management of LUTS/BPH in men without an elevated PVR and when LUTS are predominantly irritative

- **Recommendation:**
  - Check the PVR
  - Caution with high PVR>150ml
  - Don’t start it on Friday afternoon!!!

5α-Reductase Inhibitors

- **Finasteride (Type II):**
  - Half life 6-8 hrs
  - Drops serum DHT by 70%

- **Dutasteride (Type I & II):**
  - Half life 5 wks
  - Drops serum DHT by 90%

- Both reduce prostate volume 20-25%
- Decreases PSA about 50%
- Cause epithelial apoptosis
- Don’t change free/total PSA ratio
Differences in MTOPS and CombAT Study Characteristics

<table>
<thead>
<tr>
<th>Medical Therapy of Prostate Symptoms Study (MTOPS)</th>
<th>Combination of Avodart and Tamsulosin (CombAT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatments</td>
<td>Treatment vs. tamsulosin vs. combination</td>
</tr>
<tr>
<td>Setting</td>
<td>United States; select centers</td>
</tr>
<tr>
<td>Total number enrolled</td>
<td>International &gt; 100 centers</td>
</tr>
<tr>
<td>Follow-up time</td>
<td>N=4844</td>
</tr>
<tr>
<td>Endpoints</td>
<td>Up to 5.5 years</td>
</tr>
<tr>
<td>Prostate size (mean)</td>
<td>36.3 mL</td>
</tr>
<tr>
<td>Prostate-specific antigen (mean)</td>
<td>55.0 mL</td>
</tr>
</tbody>
</table>

5α-Reductase Inhibitors

- Reduce prostate volume
- Reduce the risk of AUR or need for surgery
- Combination therapy with an alpha blocker leads to greater improvement (8%) in symptoms
- Response depends on:
  - Prostate size (PSA, U/S, DRE)
  - Size of intraprostatic protrusion (IPP)
  - PSA value needs to be adjusted for interpretation
Combination Therapy (AB/5-ARI)

• Appropriate and effective

• Provided:
  – Prostate enlargement is demonstrated
  – PSA >1.5
  – (Small IPP)
### Medication Therapy: Side Effects

<table>
<thead>
<tr>
<th>Side Effect</th>
<th>Flomax&lt;sup&gt;1&lt;/sup&gt; 0.4mg</th>
<th>Flomax&lt;sup&gt;1&lt;/sup&gt; 0.8mg</th>
<th>Proscar&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Uroxatral&lt;sup&gt;3&lt;/sup&gt;</th>
<th>Rapaflo</th>
<th>Avodart&lt;sup&gt;4&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormal Ejaculation</td>
<td>8%</td>
<td>18%</td>
<td>5%</td>
<td>1-3%</td>
<td>28%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Impotence</td>
<td>-</td>
<td>-</td>
<td>8%</td>
<td>1-2%</td>
<td>1-2%</td>
<td>7.9%</td>
</tr>
<tr>
<td>Decreased Libido</td>
<td>-</td>
<td>-</td>
<td>6%</td>
<td>-</td>
<td>-</td>
<td>4.3%</td>
</tr>
<tr>
<td>Asthenia&lt;sup&gt;*&lt;/sup&gt;</td>
<td>8%</td>
<td>8%</td>
<td>-</td>
<td>3%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dizziness</td>
<td>15%</td>
<td>17%</td>
<td>-</td>
<td>6%</td>
<td>3.2%</td>
<td>-</td>
</tr>
<tr>
<td>Rhinitis</td>
<td>13%</td>
<td>18%</td>
<td>-</td>
<td>3%</td>
<td>2.1%</td>
<td>-</td>
</tr>
<tr>
<td>Somnolence</td>
<td>3%</td>
<td>4%</td>
<td>-</td>
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<td>Breast Tenderness/Erilargement</td>
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<td>3%</td>
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</tr>
</tbody>
</table>

References for this table:
2. Avodart Prescribing Information
3. Uroxatral product insert; Sanofi-Synthelabo
4. Lipid-Intermediate Prescribing Information
Complementary and Alternative Medicines (CAM)

- No dietary supplement, combination phytotherapeutic agent or other nonconventional therapy is recommended for the management of LUTS/BPH
- The available data do not suggest that Saw Palmetto has a clinically meaningful effect on LUTS/BPH
- The paucity of published, high quality, single extract clinical trials of Urtica dioica (stinging nettle) do not provide a sufficient evidence base with which to recommend for or against its use for LUTS/BPH

Saw Palmetto:
- No different than placebo
  - Some modest improvement of nocturia, compared to placebo (0.78 fewer visits/night)
Progression of BPH can result in:

- Urinary retention
- Urinary Incontinence
- Urinary tract infection
- Bladder stones
- Kidney damage
- Blood in urine
- Bladder diverticulum

Urology Referral

LUTS Evaluation
(Not in the Guideline but has significant clinical application)

- Aimed to improve predictibility of
  - disease progression
  - Response to medication
  - Need for surgical intervention

- Prostate Volume
- Resistive index of prostate capsular artery (Doppler)
- Bladder Wall Thickness and Bladder Weight
- Near Infrared Spectroscopy (NIRS)
- Intravesical Prostatic Protrusion (IPP)
- Temporary Urethral Stents
- Bio-Markers
Urinary retention Evaluation

- 65 year old with 6 months of urinary retention
- Managed with CIC
- UDS shows detrusor underactivity
- Endoscopy showed moderate bladder outlet obstruction
- History of APR 15 years ago

Temporary Prostate Stent (Spanner)

- Urinary retention (temporary Management)
- Post TUNA or TUMT
- Large floppy bladder with ? Underactive detrusor
Urinary retention
Spanner placement

- Voided with reasonable flow and minimal residual
- Underwent PVP
- Voids normally with low PVR
Bilateral Hydro due to BOO
Median lobe causing upper tract deterioration

BPH/LUTS and Bladder Diverticulum
Indications for Surgery

- Renal insufficiency
- Recurrent UTI
- Recurrent gross hematuria
- Recurrent bladder stones
  - Refractory to other therapies

Bladder diverticulum is not an absolute indication

Minimally invasive Treatments of BPH

- Transurethral Needle Ablation of Prostate (TUNA)
- Transurethral Microwave Therapy
- Laser debulking procedure
- Transurethral Incision of Prostate (TUIP)
- Transurethral Prostatectomy (TURP)
- Transurethral Vaporization of Prostate (TUVP)
Transurethral Needle Ablation of the Prostate (TUNA)

Transurethral Microwave Therapy (TUMT)

Therapy:
Temperature treatment in excess of 45°C - 50°C
Known to produce tissue coagulation
Time x Temperature (above 50°C) = tissue necrosis, symptom relief

• Heat induced hemorrhagic necrosis
• Sympathetic Nerve Degeneration
• Induction of Apoptosis
TUNA and TUMT

- Lack of sufficient durability
- Inconsistent outcome
- Attractive because:
  - Lack of sexual side effects
  - Avoidance of actual surgery and anesthesia
  - “Not burning any bridges”
- Concerns for over utilization
  - Relatively easy to apply
  - High reimbursement rate
**BPH Pathophysiology**

![BPH Pathophysiology Diagram]

**Open Simple Prostatectomy**

- Millin Modified Retropubic Prostatectomy
- Transvesical Prostatectomy
- Laparoscopic/Robotic approach
  - 4% reoperation
  - Sever bleeding 11.6%
  - 16-19% Transfusion (several studies<10%)
  - Hospital stay: 5-7 days
  - Catheter duration: 7-14 days
  - Mortality <1%
  - Incontinence 0.5%-8%
  - Bladder neck contracture 3-6%

- Hospital stay: 5-7 days
- Catheter duration: 7-14 days
- Mortality <1%
- Incontinence 0.5%-8%
- Bladder neck contracture 3-6%
Transurethral Resection of Prostate Complications
Mono-polar or Bipolar

- Bleeding (5-10%)
- Dysuria (15%)
- Extravasation (2-3%)
- Incontinencey (1-2%)
- Impotency: (5-15%)
- Retrograde ejaculation (60-80%)
- TUR syndrome (1-5% in Mono-polar group)
Laser Therapies for BPH/LUTS

- Holmium Laser Ablation (HoLAP)
- Holmium Laser Enucleation (HoLEP)
- Holmium Laser Resection of Prostate (HoLRP)
- Thulium: YAG Laser
- Potassium-Titanyl-Phosphate (KTP)/GreenLight 532nm Photovaporization of Prostate (PVP)

LUTS/BPH Therapy Summary

- There is an appropriate place for all treatment modalities
- Evaluate patient profile, safety, efficacy, and durability
- Assess patient expectations
Summary

- Significant advances in the management of LUTS/BPH have been made.
- The search for a less invasive, more efficient therapy to treat LUTS/BPH continues…
Large Bladder Due to BOO
Prostate Sizes

- Average Prostate: Approx 20 grams
- Enlarged Prostate: Approx 40 grams
- Huge Prostate: Approx 100 grams

Basic Mechanism

Light hits absorber in tissue

Heat
532nm Laser Tissue Interaction

Photo-selective Vaporization of Prostate (PVP)

- Less/no bleeding
  - Can safely be done in patients on antiplatelet and/or anticoagulation medications.
- Minimal fluid absorption (no TUR syndrome!)
- Less need for post operative catheterization
- Less risk of:
  - Incontinency
  - Erectile dysfunction (<1%)
  - Retrograde ejaculation (<30%)
- Less hospitalization (95% of patients go home in less than 23 hours)
- Faster recovery
PVP

Pre-PVP Procedure

Immediate Post PVP

Three Months Post-PVP