Voiding Dysfunction / BPH

UBC Department of Urologic Sciences
Voiding Dysfunction

Objectives

• Understand the anatomy of the lower urinary tract
• Describe the innervation of the bladder
• Understand normal micturition
• Classify Neurogenic Bladder
• Classify Urinary Incontinence
• List the treatments for the various types of incontinence
Anatomy of the Lower Urinary Tract

- Consists of the bladder and urethra
- In men the urethra consists of the penile, bulbar, membranous and prostatic portions
- Bladder consists of the detrusor and the trigone
- Detrusor consists of smooth muscle in random directions
- Problems with voiding can be classified as problems with the bladder and problems with the outlet
Neuroanatomy of the bladder

• Sympathetics (T11-L2) via aortic and superior hypogastric plexis
  → hypogastric nerves → pelvic plexus cause detrusor relaxation and bladder neck contraction

• Parasympathetics (S2,3,4) from pelvic splanchnic nerves cause detrusor to contract.

• Somatic (voluntary) control of the external urinary sphincter is derived from the pudendal nerve (S2,3,4)
Normal Filling Requires:

- Accommodation of increased volumes of urine at LOW intra-vesical pressures with appropriate sensation
- A bladder outlet that is closed at rest and remains closed with increased abdominal pressure
- No involuntary bladder contractions
Normal Emptying Requires:

- Coordinated bladder contraction of the detrusor muscle of adequate magnitude
- A concomitant lowering of resistance at the level of the urinary sphincters (bladder outlet)
- Absence of obstruction (either anatomical or functional)
Control of Micturition

**Normal filling**

- Elastic properties of the bladder allow it to stretch with small increase in pressure
- As bladder fills → sympathetic reflex
  - Stimulation of alpha adrenergic receptors at bladder neck → increase resistance
  - Activation of beta3 receptors in detrusor inhibiting contraction
  - Direct inhibition of detrusor motor neurons in sacral spinal cord
- Gradual increase in urethral pressure as bladder fills due to pudendal nerve → activation of external sphincter
- Formation of urethral mucousal seal
Control of Micturition

Normal Emptying

• Increased intravesical pressure produces the sensation of distension
• Coordination of detrusor and ext. sphincter takes place in the pontine micturition center
• → firing in PNS pathways → contraction of detrusor and relaxation of urethral smooth muscle
• Inhibition of sympathetic pathways → smooth sphincter relaxation
• Inhibition of pudendal firing → ext. sphincter relaxation
Pontine Micturition Center (PMC)

- Receives afferent input from lower urinary tract
- Receives input from forebrain, cerebellum and hypothalamus
- Cortical inputs are inhibitory
- Cerebellum involved in coordination of detrusor contraction and relaxation of bladder neck (invol. Sphincter) and external vol. sphincter
Control of Micturition

- Basal Ganglia
- Pontine Micturition Center
- Sympathetic T11-L2
- Parasympathetic S2-4
- Bladder (detrusor)
- Bladder Neck (IUS)
- External Urethral Sphincter

1. PMC receives input from GU afferents as well as areas in the brain (e.g. cerebellum, cerebral cortex, basal ganglia)
2. It coordinates micturition, by turning off the sympathetic signals and turning on the parasympathetic signals
3. This allows the contraction of the detrusor and the relaxation of the bladder outlet
4. Simultaneously the PMC coordinates the relaxation of the external urethral sphincter
Classification of Neurogenic Bladder

- Upper Motor Neuron lesion
- Lower Motor Neuron lesion
Upper Motor Neuron Lesions

1. *Cerebral Injury* (stroke, tumour, brain injury) → detrusor hyperreflexia

2. *Basal Ganglia disease* (Parkinson’s disease)
   Detrusor hyperreflexia, contractions are short, relaxation of ext. sphincter is slowed → urgency, urge incontinence, slow flow

3. *Suprasacral spinal cord damage*-above T6 → reflex micturition with detrusor-sphincter dyssynergia

4. *Suprasacral spinal cord damage*-below T6 → reflex micturition with detrusor-sphincter synergia
Lower Motor Neuron Lesion

1. Sacral Spinal cord damage (pelvic fracture, cauda equina)
   → acontractile bladder, poor bladder sensation

2. Peripheral Nerve Damage
   • eg. Diabetes, pelvic surgery, XRT
Classification of Voiding Dysfunction

- Failure to Store
- Failure to Empty
- Problem with the bladder
- Problem with the outlet
What are the goals of treatment of voiding dysfunction?

- Preserve renal function
- Treat or control infection
- Adequate storage at low pressure
- Adequate emptying at low pressure
- Social and vocational acceptability
- Therapies are classified according to their ability to either IMPROVE STORAGE or IMPROVE EMPTYING
Therapies to Facilitate Storage

BLADDER- goals-inhibit contractility, decrease sensation, increase capacity

MEDICAL
- Timed voiding, double voiding
- Kegels, biofeedback
- Pharmacologic
  - Anticholinergic
  - Musculotropic and anticholinergic
  - TCAs
  - Ca antagonists
  - B adrenergic agonists

SURGICAL
- Interrupt innervation (e.g. sacral rhizotomy)
- Modulate neural signals (bladder pacemaker)
- Augment bladder
Therapies to Facilitate Storage

OUTLET: Goal- to increase resistance

MEDICAL
• Kegels
• Biofeedback
• Electrical stimulation
• Pharmacologic
  – Alpha-agonists
  – Beta antagonists
  – estrogen

SURGICAL
• Peri-urethral injection bulking agent
• Retropubic bladder neck suspension
• Suburethral slings
• Artificial urinary sphincter

Revised Dec 2008
Therapies to Facilitate Emptying

BLADDER: Goals- increase pressure/contractility

MEDICAL
• Valsalva
• Credé
• Pharmacologic
  – Parasympathomimetic (urecholine)

SURGICAL
• Direct electrical stimulation of the bladder and sacral roots
Therapies to Facilitate Emptying

OUTLET: Goal - decrease resistance

**MEDICAL**
- At site of obstruction
  - Anti-androgens
  - 5-alpha reductase inhibitors
  - Alpha-blockers
- At site of vol. sphincter
  - Baclofen
  - Botulinum toxin
- Circumvent problem
  - Clean intermittent cath.

**SURGICAL**
- At the site of obstruction
  - Prostatectomy
  - Internal urethrotomy
  - Meatotomy
- At site of vol. sphincter
  - Sphincterotomy
  - Stent
- Circumvent problem
  - SP/urethral tube
  - Urinary diversion
Urinary Incontinence

1. *Urge Incontinence* - involuntary loss of urine with a strong desire to void.
2. *Stress Incontinence* - loss of urine with increased intra-abdominal pressure (cough, laugh, jump, rise to standing etc).
3. *Overflow Incontinence* - loss of urine with bladder over-distension.
4. *Functional Incontinence* - loss of urine associated with cognitive or physical impairment.
5. *Mixed Incontinence* - combinations of above
Urinary Incontinence

Etiology

*Failure to Store*
- detrusor overactivity
- outlet incompetence

*Failure to Empty*
- detrusor underactivity
- outlet obstruction
Urinary Incontinence

Evaluation

1. History - urgency, frequency, dysuria
   - association with valsalva maneuver
     (sneeze, cough, lifting etc.),
   - medications (diuretics, benzos, narcotics)
   - fluid intake
   - back or head injury
   - parathesias, fecal incontinence
   - diabetes
   - other neurological disease (MS, Parkinson etc.)
Incontinence Evaluation

2. Physical
   - mental status, mobility
   - abdominal and pelvic exam
   - neurological exam
   - anal tone, peri-anal sensation
   - bulbocavernosus reflex (S2,3,4)

3. Urinalysis, serum creatinine

4. Voiding Diary

5. Post Void Residual (PVR; by U/S or catheterization)

6. Urine cytology- pts with irritative voiding symptoms
Incontinence Evaluation

Specialized Tests

1. Urodynamics
   - uroflowmetry
   - multichannel urodynamics
   - video-urodynamics

2. Endoscopy (Cystoscopy)

3. Upper tract imaging (renal ultrasound)
Indications for Referral of Patient with Urinary Incontinence

1. History or physical suggestive of neurologic disease
2. Hematuria, recurrent UTIs, bladder stones, renal insufficiency (post-renal) with incontinence
3. Elevated PVR, overflow incontinence
4. Incontinence in pts with prior lower GU surgery
5. Persistence of incontinence once reversible causes are corrected
Stress Urinary Incontinence Tx

- Kegel Exercises
- Biofeedback
- Pharmacologic
  1. Alpha adrenergic agents (TCAs, SSRIs, pseudoephedrine) → increase sphincter tone & bladder outflow resistance
  2. Estrogen - cream or pill
- Periurethral collagen injections
- Pessaries
- Surgery
  - Bladder neck suspension (e.g. Burch, MMK)
  - Urethral sling (e.g. pubovaginal, TVT, TOT)
Retropubic Bladder Neck Suspension (Burch)
Urethral Sling
Urge Incontinence Treatment

- Treat underlying cause (infection, stone, tumor etc)
- Timed voiding- increase interval between voids
- Bladder Training- biofeedback, Kegels
- Pharmacologic
  - Anticholinergic (tolterodine)
  - Musculotropic and anticholinergic (oxybutinin)
  - TCAs (imipramine)
- Surgical
  - Bladder pacemaker
  - Bladder denervation (rarely done)
  - Bladder augmentation
  - Urinary diversion
Overflow Incontinence Tx

• Usually from obstruction (treat underlying cause)

• If acontractile bladder
  – Timed voiding, double voiding
  – Clean intermittent catheterization (keep bladder volumes < 400 cc) and pt dry between catheterizations
Benign Prostatic Hyperplasia (BPH)
PBL - May, 2007

Objectives are to understand:

- Clinical diagnosis of BPH - LUTS
- Complications of untreated BPH
- Medical and surgical treatments for BPH
Clinical Case

A 66 yr old man presents with a 24 month history of nocturia, day frequency and dribbling urinary stream. In the past four months he has noted increasing urgency incontinence, occasional hematuria, malaise, anorexia, low back ache and has been febrile with S/P pain for the past three days. At presentation he appears ill, has flank tenderness and a palpable bladder.
Lower Urinary Tract Symptoms (LUTS)

Definition: “a constellation of obstructive and irritative voiding disturbances of the lower urinary tract”¹

LUTS can be classified as bladder storage or sensation problems, and/or voiding or postvoiding problems²

Bothersome aspects of LUTS

- Lower urinary tract symptoms ("LUTS") may be divided into 2 broad categories:
  - STORAGE symptoms (irritative) which tend to have a greater influence in provoking patients to seek medical advice
  - VOIDING symptoms (obstructive) which tend to be of greater concern to physicians as they are more likely to result in serious sequelae
Lower Urinary Tract Symptoms
“LUTS”

Obstructive
Hesitancy, slow stream, “stuttering” stream, straining to void, sense of incomplete emptying, “double” voiding, pv dribble

Irritative
Frequency, urgency, nocturia

Dysuria and incontinence are not usually seen in uncomplicated BPH. Microhematuria is common
Differential Diagnosis of LUTS in Older Men

- **Prostate**: BPH, prostate cancer, prostatitis
- **Bladder**: cystitis, bladder tumour, bladder stone
- **Urethra**: urethral stricture, meatal stenosis, phimosis
- **Neurologic**: Parkinson’s disease, stroke, Alzheimer’s disease, spinal cord disease
- **Other**: Diabetes, sleep apnea, medication, diet, distal ureteral stone, pelvic mass
Initial Evaluation of Lower Tract Symptoms

- History
- Physical exam
- Urinalysis
- Serum creatinine
- Serum PSA (optional – if knowledge of CaP would change treatment)
- Abdominal/pelvic ultrasound (only required if there is hematuria, renal impairment, UTIs, atypical symptoms or abnormal physical exam)
- Urodynamics (only required if there is incontinence, urinary retention, atypical symptoms or a neurologic disease that might effect voiding)
Risk Factors for LUTS

✓ Increasing age

✓ Weight gain and abdominal adiposity in adulthood may contribute to LUTS\(^2,3\)

✓ Excessive alcohol drinking (>75 g/day) was associated with LUTS and BPH\(^4\)

✓ No modifiable risk factors for LUTS or underlying pathology have been conclusively identified\(^2\)

Risk Factors for LUTS

✓ Nicotine increases sympathetic nervous system activity and may exacerbate LUTS¹

- Current smokers (1 to 1.4 packs per day [ppd]): Odds ratio (OR), 0.87 compared with nonsmokers²

- Current heavy smokers (>1.5 ppd): OR, 1.32 compared with nonsmokers²

Diagnostic Evaluation

1 – Medical History
   - Includes general history, genitourinary history, family history, surgical history, drug history and general fitness.
   - OPTIONAL – Voiding diary – (i.e. input, output of fluid)

2 – Physical exam
   - Includes general exam, genitourinary exam, focused neurological and DRE (digital rectal exam)

3 – IPSS/AUA symptom score
Some questions to ask your patient

Hematuria
Dysuria
Incontinence
Abdominal or flank pain
Previous transurethral surgery
CNS, neurologic diseases (Parkinson’s, stroke, etc…)
Medications (oral decongestants, antidepressants)
Diabetes
Previous STDs or perineal trauma
Physical Exam

- Digital Rectal Exam (DRE)
- Doctor feels prostate for size, condition
- Healthy = soft
- Unhealthy = hard, assymetrical
Size of gland ≠ LUTS
# International Prostate Symptom Score (I-PSS)

<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>
<th>Almost always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Over the past month, how often have you had a sensation of not emptying your bladder completely after you finished urinating?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. Over the past month, how often have you had to urinate again less than two hours after you finished urinating?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<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>
<td>1</td>
<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>
</tr>
<tr>
<td>6. Over the past month, how often have you had to push or strain to begin urination?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<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>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

**Total I-PSS Score =**

### Quality of Life Due to Urinary Symptoms

<table>
<thead>
<tr>
<th>Question</th>
<th>Delighted</th>
<th>Pleased</th>
<th>Mostly satisfied</th>
<th>Mixed about equally satisfied and dissatisfied</th>
<th>Mostly Disatisfied</th>
<th>Unhappy</th>
<th>Terrible</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. If you were to spend the rest of your life with your urinary condition just the way it is now, how would you feel about that?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

**Quality of Life assessment index QOL =**
Evaluation - Tests

1 – Urinalysis
   ▪ Dipstick or microscopic evaluation
2 – PSA (with DRE)
   ▪ After risk benefit discussion with patient
   ▪ If patient expected to live >10yrs or knowledge of prostate cancer would change management
   ▪ If knowledge of PSA would change management of voiding symptoms
3 – Urine Cytology (optional)
   ▪ In men with predominately irritative symptoms, smokers
4 – Serum creatinine (not recommended as routine)
Post-Void Residual (PVR)

- Measures amount of urine left in bladder after urinating
- Too much residual may suggest blockage
- Measured by catheter or ultrasound
Abdominal Ultrasound

- Images of entire urinary tract
Trans-rectal Ultrasound

- Probe inserted
- Images of prostate
Cystoscopy

- Cystoscope penis numbed
cystoscope inserted images
displayed on screen

- Helps determine size of prostate, location of obstruction
Uroflowmetry

- Uroflowmeter measures speed of urine flow
- Lower than normal flow can indicate BPH
Urodynamic Studies (Pressure Flow Study)

- Urine flow & bladder pressure
- High pressure, low flow = obstruction
- Catheter (tube) inserted
- Water runs into bladder through catheter
- Flow and pressure measured while urinating
- Takes about 20 to 30 minutes
BPH: Benign Prostatic Hyperplasia

BPH is prevalent and relevant
BPH

• The U.S. Census Bureau reports there are more than 31 million men over the age of 50.
• Half of these men suffer symptoms of an enlarged prostate.
• Approximately 80% of men in their 80s experience prostate enlargement.
ureteric orifice
trigone of bladder
bladder neck
external urethral sphincter
(striated sphincter)
Complications of BPH Progression

Worsening of symptoms
Increase in bother
Decrease in quality of life

BPH progression

Acute urinary retention (AUR)
Surgery

Alarm symptoms
Hematuria
UTI
Bladder stones
Renal failure

Clinical Case

A 66 yr old man presents with a 24 month history of nocturia, day frequency and dribbling urinary stream. In the past four months he has noted increasing urgency incontinence, occasional hematuria, malaise, anorexia, low back ache and has been febrile with S/P pain for the past three days. At presentation he appears ill, has flank tenderness and a palpable bladder.
Complications of BPH

- Urinary retention (acute or chronic)
- Renal failure
- Recurrent UTIs
- Bladder stones
- Hematuria
Advanced BPH Progression

Revised Dec 2008

UBC Phase IV Lecture
Voiding Dysfunction/BPH
Revised Dec 2008

Treatment

Rx BPH = ↓ Sx ↑ QOL

↓ Progression

↓ Inflamm’n

↓ Instability

↓ Metabolism
Treatment Objectives

**Benefit**
Efficacy: Reduction of symptoms and disease progression

**Risk**
Morbidity: Risk of treatment induced adverse events
The Problem:

**BPH ≠ BPE ≠ BOO ≠ LUTS**

- **All Men > 40 yrs**
- **BPE** Enlargement
- **BOO** Obstruction
- **Histologic BPH**
- **LUTS / Bother**
Men remain Ostriches

- Although clinical BPH is associated with significant impairment of quality of life, many BPH sufferers are reluctant to consult a doctor, perhaps because of fear of surgery or cancer or sexual dysfunction.
- As the population of the world progressively ages, so the burden of BPH and prostate cancer will inevitably rise.
Treatment philosophy has changed dramatically in the past 20 years, evolving from a paradigm that relied almost exclusively on surgery to that of medical therapy.
Current practice

The therapeutic cascade (step-up):

- lifestyle measures,
- phytotherapy
- alpha blockade
- 5 ARIs
- combination med therapy
- anticholinergics (occasionally)
- intermediate therapies (MIS)
- intervention under GA (TUR, etc)
Lifestyle Modification

- decrease fluids
- caffeine
- alcohol
- time diuretics
- decongestants
- exercise
- weight loss
- sleep apnea
- diet
Phytotherapy
Rationale for the use of $\alpha$-adrenergic antagonists
α-adrenergic antagonists (α-blockers) for BPH

Terazosin (Hytrin): $\alpha_1$ selective; 2 mg – 10 mg daily; approximately 70% of men experience “satisfactory” improvement in symptoms; common side effects include dizziness, fatigue and rhinorrhea

Doxazosin (Cardura): $\alpha_1$ selective; 4 mg – 8 mg daily; side effects similar to terazosin; effectiveness similar to terazosin

Tamsulosin (Flomax): $\alpha_1$-subtype A selective; 0.8 mg daily; similar effectiveness but significantly fewer side effects compared to other α-blockers; retrograde ejaculation

Alfuzosin (Xatral): $\alpha_1$-subtype A selective; 10 mg daily; similar to flomax but less retrograde ejaculation
Are All Alpha Blockers Equal?

- Efficacy
- Ease of administration
- Side effects profile
- Safety in the elderly
- Safety with hypertension
$\alpha_1$-AR Antagonists Fast Relief of Symptoms & Bother

- Finasteride (N=202)
- AR antagonist

*P<0.05 vs. finasteride

Efficacy

- The differences are minor
- Safe to say they are essentially EQUAL
Sid Effects Profile

- Cardiovascular
- Dizziness
- Ejaculatory problems

Not Equal
Interactions between Alpha Blockers and PDE5-i

• PDE5i and alpha blockers can induce a mild hypotensive reaction.

• Clinically significant synergistic hypotension is an unusual, but potential effect of combo-Tx

• Selective alpha blockers (alfuzosin & tamsulosin) are safe with all PDE5i
Regulation of Cell Growth in the Prostate in BPH

Serum testosterone (T)  Serum DHT

T
5AR (1 and 2)

Growth factors

DHT
DHT-androgen receptor complex

Prostate cell

Increased Cell growth

Unbalanced

Cell death
Two 5a-reductase (5-AR) Isoenzymes Convert Testosterone to DHT

Different Type I and Type II 5-AR Isoenzyme Inhibition by Dutasteride and Finasteride

- Dutasteride
- Finasteride

Prostate volume reduced

Testosterone

DHT

Proscar Longterm Efficacy and Safety Study (PLESS)

- 3040 randomized 4 years Placebo vs Finasteride
- Finasteride most effectively decreased the risk of AUR or Surgery in men with larger prostates (>55cc)
- Men with smaller glands also achieved significant benefit compared with placebo
Incidence of Acute Urinary Retention at Year 4 by Baseline Prostate Volume Tertile

- Placebo (N=155)
- Finasteride (N=157)

Percent of Patients

- 14 to 41 (Low-Tertile): 8.9% Placebo, 5.1% Finasteride, 50% reduction
- >41 to 57 (Mid-Tertile): 6.8% Placebo, 40% reduction
- 58 to 150 (High-Tertile): 22.0% Placebo, 74% reduction

= Reduction in risk over 4 years (Life Table Analysis)
Incidence of BPH-Related Surgery at Year 4 by Baseline PSA Tertile

![Graph showing the incidence of BPH-related surgery at Year 4 by baseline PSA tertile.](image)

- Placebo (N=1503):
  - 0 to 1.3 (Low-Tertile): 7.8% (43% reduction)
  - 1.4 to 3.2 (Mid-Tertile): 6.9% (46% reduction)
  - 3.3 to 12 (High-Tertile): 8.3% (60% reduction)

- Finasteride (N=1513):
  - 0 to 1.3 (Low-Tertile): 4.4%
  - 1.4 to 3.2 (Mid-Tertile): 12.6%
  - 3.3 to 12 (High-Tertile): 19.9%

↓ Reduction in risk over 4 years (Life Table Analysis)
Proscar Longterm Efficacy and Safety Study (PLESS)

Extension study:

- 858 patients on Placebo given Fin for 2 years
- The higher risk of AUR or Surgery in the Placebo arm was reduced in year 5 and became the same at year 6
- Delayed treatment still helpful
Probability of Developing Any AUR and/or Needing BPH-Related Surgery Over 6 Years

Study Year

Double-Blind

Open Finasteride Extension

Pbo ® Fin

Fin ® Fin

Pbo

Fin 5 mg

Probability of Developing AUR and/or Needing BPH-Related Surgery
Could Combination Therapy Be a Better Approach?
Two-Drug Therapy Activates Two Distinct and Synergistic Mechanisms of Action

Alpha blockers
- Improve symptoms and increase urinary flow rate by relaxing prostatic and bladder neck smooth muscle through sympathetic activity blockade

5-Alpha reductase inhibitors
- Improve symptoms, increase urinary flow rate, and prevent BPH outcomes by reducing prostate enlargement through hormonal mechanisms

Objective of MTOPS

To determine whether long-term medical therapy with PROSCAR™, the alpha blocker doxazosin, or their combination will prevent or delay the clinical progression of BPH

• *Independently Conducted by the US National Institutes of Health (NIH)*
Recruitment and Randomization

Screening Visit 1 = 4,391

Screening Visit 2 = 3,483

Randomization = 3,047

Placebo = 737
Placebo Doxazosin
Placebo Finasteride

Doxazosin = 756
Active Doxazosin
Placebo Finasteride

Finasteride = 768
Placebo Doxazosin
Active Finasteride

Combination = 786
Active Doxazosin
Active Finasteride
Cumulative Incidence of BPH Progression

Percent with Event

Years from Randomization

Placebo  Doxazosin  Finasteride  Combination

p < 0.0001 ; df = 3
Finasteride responsible for the entirety of the risk reduction

\[ p = 0.0034 \; ; \; df = 3 \]
Medical Therapy Algorithm

Patient

IPSS ≤7

No or little bother

Prostate small
PSA low

No Treatment

Prostate large
PSA high

Preventive therapy
5α-Reductase Inhibitor

IPSS >7

Moderate to severe bother

Prostate small
PSA low

α-Adrenergic Blocker

Prostate large
PSA high

5α-Reductase Inhibitor Combination Rx
Surgical Therapy

• “Minimally invasive therapy”
  – Injections – eg. Botox™, alcohol
  – Photodynamic therapy (PTD)
  – Microwave heat treatment
  – High Intensity Frequency Ultrasound (HIFU)
  – Needle ablation / radio-wave treatment
  – Electrovaporization of prostate

• Laser therapy
• Transurethral resection (TURP)
• Open surgery
Indications for surgery for BPH

- Symptoms refractory to medical therapy
- Recurrent UTI
- Urinary retention
- Recurrent hematuria
- Renal impairment
The ‘Gold Standard’: TURP (TUPR)?

- Trans-Urethral Resection of the Prostate
- Removes obstruction
- Allows urine to flow more freely
Before and After TURP

BEFORE

AFTER
Transurethral Prostatic Resection (TUPR)
BPH “Chips” From TUPR
Clinical Case

A 66 yr old man presents with a 24 month history of nocturia, day frequency and dribbling urinary stream. In the past four months he has noted increasing urgency incontinence, occasional hematuria, malaise, anorexia, low back ache and has been febrile with S/P pain for the past three days. At presentation he appears ill, has flank tenderness and a palpable bladder.

Patient found to be azotemic and septic. He was managed by bladder drainage, antibiotics and intravenous fluid resuscitation. Eventually he underwent a successful TUPR.
Additional Reading Resources

- Lange Surgery Textbook
- Urology for the House Officer
- Smith’s Urology
- Campbell’s Urology
Conclusion

• Always go back to basics when faced with problems in urology ("it’s just plumbing")

• Do an elective in urology
  – Vancouver
  – Prince George
  – With local specialist in many communities