VOIDING DYSFUNCTION IN ELDERLY MALE

CURRENT STATUS

DR. FRANCIS LEE

Pedder Clinic
Voiding dysfunction

Storage

Emptying
Common voiding dysfunction in elderly male

- Emptying
  - BPH
- Storage
  - Incontinence
  - Overactive bladder
  - Post-prostatectomy
BPH is the fourth most diagnosed condition in men aged ≥50 years in the US.

CAD and hyperlipidaemia: 51.3%
Hypertension: 45.2%
Type 2 diabetes: 17.5%
Enlarged prostate: 13.5%
Osteoarthritis: 13.3%
Arrhythmias: 8.8%
Cataracts: 8.6%
GERD: 8.4%
Bursitis: 8.0%
Prostate cancer: 7.8%
Prevalence of BPH with age

- 50% of men at age of 60
- 80% of men at age of 80
- 25% of them have significant loss of quality of life
## Classification of LUTS

<table>
<thead>
<tr>
<th>Symptom type</th>
<th>Symptom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage symptoms (previously called irritative)</td>
<td>Increased daytime frequency</td>
</tr>
<tr>
<td></td>
<td>Nocturia</td>
</tr>
<tr>
<td></td>
<td>Urgency</td>
</tr>
<tr>
<td></td>
<td>Urinary incontinence</td>
</tr>
<tr>
<td>Voiding symptoms (previously called obstructive)</td>
<td>Slow stream</td>
</tr>
<tr>
<td></td>
<td>Splitting or spraying</td>
</tr>
<tr>
<td></td>
<td>Intermittent stream</td>
</tr>
<tr>
<td></td>
<td>Hesitancy</td>
</tr>
<tr>
<td></td>
<td>Straining</td>
</tr>
<tr>
<td></td>
<td>Terminal dribble</td>
</tr>
<tr>
<td>Post micturition symptoms</td>
<td>Feeling of incomplete emptying</td>
</tr>
<tr>
<td></td>
<td>Post micturition dribble</td>
</tr>
</tbody>
</table>

Diagnosis of BPH

- Symptoms
  - International Prostate Symptom Score (IPSS score)
- Rectal examination (> 20 gm)
- Uroflowmetry (< 10 ml/sec)
- Residual urine volume
- MSU
- PSA
BPH Prevalence

The graph shows the prevalence of benign prostatic hyperplasia (BPH) across different age groups, with data from various studies. The x-axis represents age ranges from 20-29 to 80-89, while the y-axis indicates the percent prevalence. Each line represents a different study, with the average (smoothed) line shown in black. The studies include Pradhan 1975, Swyer 1944, Franks 1954, Moore 1943, Harbitz 1972, Holund 1980, Baron 1941, Fang-Liu 1991, and Karube 1961.
The incidence and prevalence of LUTS due to BPH increase with age

Prevalence of moderate-to-severe LUTS increases with age

Proportion of men with IPSS >7 (%)

- 50–59: 20.0%
- 60–69: 30.1%
- 70–79: 37.4%
- ≥80: 41.2%

Pathophysiology of BPH Symptoms

- Prostate Hyperplasia
- Bladder Outlet Obstruction
- Detrusor Response
- Lower Urinary Tract Symptoms
- Non-BPH Causes of Obstruction
  - Detrusor Aging Effects
  - Neurogenic Disease
  - Primary Bladder Disease
- Polyuria

LUTS
Voiding symptoms are most common and storage symptoms are most bothersome

Prevalence*

Bothersomeness†


*Reported that symptom occurs at least occasionally
†Symptom reported to cause at least a bit of a problem
LUTS diminishes various aspects of quality of life according to symptom severity.

Scale: 0–1 (health status: 0=best; 1=worst)
*Higher scores indicate worse health status for all measures

The presence and severity of LUTS are risk factors for sexual dysfunction

- Sexual activity is common in a majority of men aged 50–80 years and is an important component of quality of life
- Men with moderate-to-severe LUTS are at increased risk for
  - Erectile dysfunction
  - Ejaculatory dysfunction
  - Hypoactive desire

Ejaculatory dysfunction is strongly associated with LUTS severity.
Risk factors for BPH

The Baltimore Longitudinal Study Of Aging

- Obese men (BMI 30-34 kg/m²) (OR 1.27)
- Severely obese men (BMI ≥ 35 kg/m²) (OR 3.52)
- Waist > 90cm (OR 3.37)
- Elevated fasting glucose (>110 mg/dL) (OR 2.98)
- A diagnosis of diabetes (OR 2.25)
# Family History of BPH

<table>
<thead>
<tr>
<th>BPH (%)‡ Relatives</th>
<th>Frequency of Clinical</th>
<th>Age-Adjusted</th>
<th>Significance ‡</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Case Relatives</td>
<td>Control Relatives</td>
<td>Odds Ratio (unadjusted)</td>
</tr>
<tr>
<td>All first-degree male relatives</td>
<td>28.3</td>
<td>8.6</td>
<td>4.2 (1.7-10.2)</td>
</tr>
</tbody>
</table>

* Percent of informative male relatives with history of prostatectomy (open or transurethral) for BPH (60 case relatives and 105 control relatives).

‡ Chi-square analysis of proportions; Taylor 95% confidence intervals in parentheses.

‡‡ Cox proportional hazards survival model. Censored outcome—prostatectomy. Time variable—age at death or current age. Values in parentheses indicate 95% confidence intervals.
Familial BPH

• Larger prostate size
  • mean prostate volume
    • 82.7 mL in men with hereditary
    • 55.5 mL in men with sporadic BPH
• Earlier onset of symptoms
• More severe symptoms
Risk factors for BPH

• Frequency of ejaculation has no effect on LUTS, peak urinary flow rates, or prostate volume
• No definite correlation with hypertension, alcohol or smoking
• Results of studies on the relationship of BPH with diet varied – a diet with less meat and diary products and more vegetable may be protective
Natural history of BPH

- 107 men with LUTS due to BPH & no treatment
- FU for 5 yrs
- 31 improved
- 50 unchanged
- 26 worsened
  - 10 TURPs (2 for AUR)

Ball et al. BJU 1981 53:613
Progression of BPH

MTOPS – placebo arm
Symptom progression in patients presenting with mild symptoms (IPSS<8)

Cumulative incidence (%)  
- Moderate symptoms (IPSS 8–18)
- Severe symptoms (IPSS 19–35)

Djavan B et al. Urology 2004;64:1144–8
Changes of BPH symptoms over 3 yrs in a Scottish study

• Who is at risk of BPH progression?
Age and symptom severity

Chart showing the percentage of AUA SI > 7 across different age groups:

- **40–49 years**: 26%
- **50–59 years**: 33%
- **60–69 years**: 41%
- **70–79 years**: 46%

Chute CG et al. J Urol 1993;150:85–89
Age and incidence of AUR

![Graph showing the age and incidence of AUR per 1,000 person-years across different age groups.]

- **45–49 years**: 0.7
- **50–59 years**: 3.2
- **60–69 years**: 7.4
- **70–79 years**: 9.3
- **80–83 years**: 12.2

BPH in old age

- Progression to urinary retention in 5 years
  - 10% in 70’s
  - 33% in 80’s

Symptom severity and urinary flow rate vs. risk of AUR

Post-void residual urine volume

Overall BPH progression

≥4-point AUA SS progression

AUR

Invasive therapy

MTOPS

Crawford ED et al. J Urol 2006;175:1422–7
Men with large prostate glands (>50 ml) compared with men with normal-sized or small prostate glands are:

- 3.5 times more likely to have moderate or severe symptoms
- 2.5 times more likely to have decreased flow rates
- 3–4 times more likely to suffer AUR
- 4 times more likely to need medical or surgical intervention

Prostate volume and BPH progression

<table>
<thead>
<tr>
<th>Incidence rate (events per 100 Pyr)</th>
<th>Total prostate volume</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;31 ml</td>
</tr>
<tr>
<td>Overall BPH progression</td>
<td>3.4</td>
</tr>
<tr>
<td>≥4-point AUA SS progression</td>
<td>3.0</td>
</tr>
<tr>
<td>AUR</td>
<td>0.3</td>
</tr>
<tr>
<td>Invasive therapy</td>
<td>0.6</td>
</tr>
</tbody>
</table>

p<0.0001  p=0.001  p=0.034  p=0.0005

Crawford ED et al. J Urol 2006;175:1422-7

MTOPS
Prostate volume vs. AUR & Surgery

ARIA, Dutasteride Phase III Trial “A”
MTOPS, Medical Therapy of Prostatic Symptoms
PLESS, Proscar Long-Term Efficacy and Safety Study
PCPT, Prostate Cancer Prevention Trial
Total prostate volume and PSA

![Graph showing the relationship between total prostate volume (ml) and serum PSA (ng/ml) for different age groups.](image)
PSA level and symptom outcomes in the placebo arm in PLESS

PSA and BPH progression

**Incidence rate (events per 100 Pyr)**

<table>
<thead>
<tr>
<th>PSA level</th>
<th>Overall BPH progression</th>
<th>≥4-point AUA SS progression</th>
<th>AUR</th>
<th>Invasive therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1.6 ng/ml</td>
<td>3.1</td>
<td>2.8</td>
<td>0.3</td>
<td>0.8</td>
</tr>
<tr>
<td>≥1.6 ng/ml</td>
<td>5.9</td>
<td>4.5</td>
<td>1.0</td>
<td>1.8</td>
</tr>
</tbody>
</table>

- PSA level: p=0.0002
- ≥4-point AUA SS progression: p=0.0281
- AUR: p=0.029
- Invasive therapy: p=0.018

MTOPS

Crawford ED et al. J Urol 2006;175:1422-7
PSA vs. AUR & Surgery

ARIA, Dutasteride Phase III Trial “A”
MTOPS, Medical Therapy of Prostatic Symptoms
PLESS, Proscar Long-Term Efficacy and Safety Study
PCPT, Prostate Cancer Prevention Trial
PSA & BPH

- 28% with PSA > 4 ng/ml
- PSA values predict prostate size
- High PSA predicts symptom progression, urinary retention and surgery
## Risk factors during watchful waiting

<table>
<thead>
<tr>
<th></th>
<th>Predict symptom progression</th>
<th>Predict ARU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q_{max} &lt; 10 ml/s</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>PVR &gt; 150 ml</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Prostate vol. &gt; 30 ml</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>PSA &gt; 2 ng/ml</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Based on VA, PLESS and MTOPS studies
PSA velocity & BPH

- 594 patients on watch waiting or α blockers
- PSA velocity of > 0.5 ng/ml/year indicated increased risk for surgery

De la Rosette et al. AUA 2005 Abstract 1290
Inflammation as cause of BPH

- MTOPS (Medical Therapy of Prostate Symptoms Trial)
- Around 40% biopsy specimens had chronic inflammatory infiltrates
- Mean FU 4.5 yrs
- Symptom progression occurred in
  - 21% with inflammation
  - 13.2% without inflammation

Roehrborn et al. AUA Meeting 2005 Abstract 1277
NSAIDs & BPH

- Olmsted county, Minnesota
- 796 out of 2,447 men taking daily NSAIDs
- Less incidence of
  - moderate/severe urinary symptoms (HR 0.73)
  - low maximum flow rate (HR 0.51)
  - increased prostate volume (HR 0.53)
  - elevated prostate-specific antigen level (HR 0.52)

Europe (EU+non EU) 3,714 patients

Latin America 726 patients

Asia 848 patients

Middle-East 639 patients

Canada 407 patients

North Africa 190 patients

By June 30th 2004, 6,523 men enrolled in an open study with alfuzosin 10mg OD

Emberton et al. J. Urol. 2005, 173 (suppl.), 463 (abstract 1708)
### Impact of Treatment Response

<table>
<thead>
<tr>
<th></th>
<th>AUR</th>
<th>BPH Surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement &gt;6</td>
<td>0.4%</td>
<td>0.4%</td>
</tr>
<tr>
<td>(n=11)</td>
<td></td>
<td>(n=13)</td>
</tr>
<tr>
<td>Improvement 3-6</td>
<td>0.1%</td>
<td>0.6%</td>
</tr>
<tr>
<td>(n=2)</td>
<td></td>
<td>(n=9)</td>
</tr>
<tr>
<td>Improvement 1-2</td>
<td>0.5%</td>
<td>1.0%</td>
</tr>
<tr>
<td>(n=3)</td>
<td></td>
<td>(n=6)</td>
</tr>
<tr>
<td>Stable (0) or Worsening 1-3</td>
<td>1.4%*</td>
<td>4.1%*</td>
</tr>
<tr>
<td>(n=8)</td>
<td></td>
<td>(n=23)</td>
</tr>
<tr>
<td>Worsening ≥4</td>
<td>1.0%*</td>
<td>4.9%*</td>
</tr>
<tr>
<td>(n=3)</td>
<td></td>
<td>(n=14)</td>
</tr>
</tbody>
</table>

*IPSS change (improved vs stable or worse), p <0.01

Emberton et al. J. Urol. 2005, 173 (suppl.), 463 (abstract 1708)
Impact of Treatment Response on AUR

- Age: <65, >65
- PSA: <1.4, >1.4-3.2, >3.3
- Prior Unoperated AUR: No, Yes
- Baseline IPSS: <20, >20
- Treatment response (IPSS): Yes, No
- Baseline bother: ≤3, >3
- Treatment response (bother): ≤3, >3

Emberton et al. J. Urol. 2005, 173 (suppl.), 463 (abstract 1708)
Impact of Treatment Response on BPH Surgery

Emberton et al. J. Urol. 2005, 173 (suppl.), 463 (abstract 1708)
Impact of Treatment Response on BPH Surgery

Change in IPSS at the last available assessment before BPH-related surgery

Log-rank test $p < 0.01$

Cumulative incidence of surgery

Time from treatment start (days)

IPSS improved

No improvement
Men who experience no symptom improvement or symptom deterioration during alfuzosin treatment are at increased risk of BPH progression and surgery.
Risk factors for BPH Progression

Old age

Previous AUR+++ 

Concomitant prostatitis

Severe LUTS

Symptom deterioration while on α-blocker

Large prostate size

High PSA level

High PSA velocity

Low Qmax

Large PVR

ALTESS, PLESS, MTOPS
De la Rosette et al. AUA 2005 Abst. 1290
Urinary incontinence in men

- Survey 7,274 men > 20 yrs
- 12.4% men had incontinence
- 4.5% men had moderate to severe incontinence

Markland et al. J Urol 2010; 184:1022
Prevalence of UI in men by symptom severity

Markland et al. J Urol 2010; 184:1022
Prevalence of urinary incontinence in men

Table 1. Prevalence of moderate to severe UI symptoms in men 20 years old or older

<table>
<thead>
<tr>
<th>Age</th>
<th>No. Men*</th>
<th>% Moderate–Severe UI (95% CI)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>20–34</td>
<td>1,143</td>
<td>0.7 (0.4, 1.6)†</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>35–44</td>
<td>803</td>
<td>1.6 (0.6, 3.8)</td>
<td></td>
</tr>
<tr>
<td>45–54</td>
<td>806</td>
<td>4.7 (3.2, 6.7)</td>
<td></td>
</tr>
<tr>
<td>55–64</td>
<td>716</td>
<td>6.6 (4.6, 9.4)</td>
<td></td>
</tr>
<tr>
<td>65–74</td>
<td>633</td>
<td>11.2 (8.4, 14.8)</td>
<td></td>
</tr>
<tr>
<td>75+</td>
<td>573</td>
<td>16.0 (13.0, 19.4)</td>
<td></td>
</tr>
</tbody>
</table>

Markland et al. J Urol 2010; 184:1022
Risk factors for urinary incontinence in man

- Age
- Major depression
- Hypertension
- Poor self-rated health
- Prostate cancer
- BPH
- Arthritis
- Stroke
- Coronary heart disease
- 3 or more chronic diseases

Markland et al. J Urol 2010; 184:1022
LUTS and falls in elderly

- Urinary incontinence – strongest predictors for recurrent falls
  

- 20 to 50% of falls in institutions are associated with toileting
  
Types of incontinence

- Urge
- Stress
- Overflow
- Functional
## Urge incontinence

<table>
<thead>
<tr>
<th></th>
<th>women</th>
<th>men</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of urge or mixed</td>
<td>51</td>
<td>92</td>
</tr>
<tr>
<td>incontinence</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

OVERACTIVE BLADDER

ICS definition

Prevalence of OAB in > 40 yrs

Milsom et al. BJU Int 2001; 87:760
Prevalence of Overactive Bladder Syndrome (OAB)

EU SIFO Study

Milsom I et al. 2001

US NOBLE Study

Stewart et al, 2001
BPH and Overactive Bladder Symptoms

Voiding Symptoms Are Most Prevalent and Storage Symptoms Are Most Bothersome

- Reported that symptom occurs at least occasionally
- Symptom reported to cause at least a bit of a problem

BPH and OAB

- Over 70% men with BPH experienced OAB symptoms
- 70 – 80% of men with BPH found these OAB symptoms bothersome

OAB & depression

- 32% patients with OAB reported depression
- 28% reported to be very depression

<table>
<thead>
<tr>
<th></th>
<th>OAB dry</th>
<th>OAB wet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional stress</td>
<td>19.6%</td>
<td>36.4%</td>
</tr>
<tr>
<td>Depression</td>
<td>23.3%</td>
<td>39.8%</td>
</tr>
</tbody>
</table>

Irwin et al. BJU Int 2006; 97:96
Interference with work

Irwin et al. BJU Int 2006; 97:96
Post radical prostatectomy incontinence

- 985 patients after retropubic radical prostatectomy
- 92.3% 0-1 pad/day after 24 months
- Independent factors predicting incontinence in multivariate study
  - Age at operation
  - Anastomotic stricture
  - Bilateral neurovascular bundles resection

Sacci et al. BJU Int 2006; 97:1234
Incontinence after robotic prostatectomy

<table>
<thead>
<tr>
<th>References</th>
<th>Data Collection Method</th>
<th>Definition of Continence</th>
<th>% Urinary Continence (mos)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costello et al²</td>
<td>Unvalidated questionnaire</td>
<td>Use of 1 pad or less daily</td>
<td>73 (3), 82 (6)</td>
</tr>
<tr>
<td>Joseph et al⁵</td>
<td>Not specified</td>
<td>Use of no pad</td>
<td>96 (6)</td>
</tr>
<tr>
<td>Menon et al⁸</td>
<td>Unvalidated questionnaire:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No leak</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use of 1 pad or less daily</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mottrie et al⁷</td>
<td>Not reported</td>
<td>Use of 1 pad or less daily</td>
<td>95 (6)</td>
</tr>
<tr>
<td>Patel et al³</td>
<td>Expanded PCa Index Composite questionnaire</td>
<td>Use of no pad</td>
<td>89 (3), 95 (6), 97 (12)</td>
</tr>
<tr>
<td>Krambeck et al⁰⁰</td>
<td>Unvalidated questionnaire</td>
<td>No leak or use only security pad</td>
<td>92 (12)</td>
</tr>
<tr>
<td>Murphy et al⁹</td>
<td>Not specified</td>
<td>Use of 1 pad or less daily</td>
<td>91 (12), 94.7 (36)</td>
</tr>
<tr>
<td>Shikanov et al⁵</td>
<td>Open interview</td>
<td>Use of 1 pad or less daily</td>
<td>57 (3), 63 (6), 82 (12), 93 (24)</td>
</tr>
<tr>
<td></td>
<td>UCLA-PCI questionnaire</td>
<td>Use of 1 pad or less daily</td>
<td>44 (3), 50 (6), 62 (12), 69 (24)</td>
</tr>
<tr>
<td>Wiltz et al⁴</td>
<td>UCLA-PCI questionnaire</td>
<td>Use of 1 pad or less daily</td>
<td>13 (1), 30 (3), 53 (6), 65 (12), 68 (24)</td>
</tr>
<tr>
<td>Present series</td>
<td>ICIQ-UI SF</td>
<td>No leak</td>
<td>90 (12)</td>
</tr>
</tbody>
</table>

Novara et al. J Urol 2010; 184:1028
## Table 2. Regression analysis of 12-month urinary continence

<table>
<thead>
<tr>
<th></th>
<th>Univariable Analysis</th>
<th>Multivariable Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>95% CI</td>
</tr>
<tr>
<td>Age (continuous)</td>
<td>1.075</td>
<td>1.010–1.144</td>
</tr>
<tr>
<td>BMI (continuous)</td>
<td>1.097</td>
<td>0.970–1.240</td>
</tr>
<tr>
<td>Charlson comorbidity index</td>
<td>1.671</td>
<td>1.150–2.429</td>
</tr>
<tr>
<td>Preop IIEF-5</td>
<td>0.988</td>
<td>0.927–1.052</td>
</tr>
<tr>
<td>PSA (ng/ml) (continuous)</td>
<td>1.017</td>
<td>0.971–1.065</td>
</tr>
<tr>
<td>Clinical T stage (cT1 vs cT2)</td>
<td>0.574</td>
<td>0.193–1.708</td>
</tr>
<tr>
<td>Biopsy Gleason score (6 or less vs 7 or greater)</td>
<td>0.909</td>
<td>0.356–2.323</td>
</tr>
<tr>
<td>D’Amico risk group:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>1</td>
<td>Referent</td>
</tr>
<tr>
<td>Intermediate</td>
<td>0.672</td>
<td>0.263–1.720</td>
</tr>
<tr>
<td>High</td>
<td>0.819</td>
<td>0.183–3.830</td>
</tr>
</tbody>
</table>

Novara et al. J Urol 2010; 184:1028
Continence

- Age
- Nerve preservation
- Surgeon experience

Standford et al. JAMA 2000; 283:354

- Membranous urethral length

Improving continence

- Minimal dissection of tissue distal to apex of prostate
- Preservation of periurethral tissue and urethral length
- Bladder neck preservation
- Reconstruction of bladder neck
- Nerve preservation
Thank You