Underactive Bladder and Bladder Outlet Obstruction: Is Surgery Indicated?

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Disclosures

• Allergan – Scientific trial
• Medtronic – Scientific trial
• Serenity – Investment interest

• Chair AUA Office of Education
Definitions: Detrusor Function

• Normal detrusor function
  • Voluntarily initiated continuous detrusor contraction that leads to complete bladder emptying within a normal time span, and in the absence of obstruction

• Detrusor underactivity
  • Contraction of reduced strength and/or duration, resulting in prolonged bladder emptying and/or a failure to achieve complete bladder emptying within a normal time span

• Acontractile detrusor
  • No demonstrable contraction during UDS

UDS Diagnoses
Definitions: Bladder Outlet Obstruction

• The generic term for obstruction during voiding and is characterized by increased detrusor pressure and reduced urine flow rate

• It is usually diagnosed by studying the synchronous values of flow rate and detrusor pressure

UDS Diagnosis
• **Underactive bladder** is characterized by a slow urinary stream, hesitancy and straining to void, with or without a feeling of incomplete bladder emptying sometimes with storage symptoms.

• **Lower urinary tract symptoms suggestive of bladder outlet obstruction** is a term used when a man complains predominately of voiding symptoms in the absence of infection or obvious pathology other than possible causes of outlet obstruction.
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ICS Nomogram

Bladder Outlet Obstruction Index  BOOI = PdetQmax - 2*Qmax

BOOI > 40 = obstructed
BOOI 20 - 40 = equivocal
BOOI < 20 = unobstructed
Bladder Contractility Index (BCI): $\text{pdet}Q_{\text{max}} + 5(\text{Qmax})$
There is plenty of “grey” area
**Theoretical Treatment Options for Detrusor Underactivity**

**Bladder Related**
- Increasing intravesical pressure or facilitating bladder contractility
- External compression, Valsalva
- Timed voiding
- Promotion / initiating reflex contraction
- Pharmacologic therapy

**Outlet Related**
- Decreasing outlet resistance
- At a site of anatomic obstruction
- At level of striated sphincter

**Circumventing the Problem**
- Urinary diversion (conduit)

**No effective pharmacotherapy for DU/UAB exists**
- Reduction cystoplasty
- Bladder myoplasty
- Tissue engineering

**May or may not work – does not address the bladder**
- Prostatectomy, prostatotomy
- Bladder neck incision or resection
- Urethral stricture repair or dilation
- Intraurethral stent
- Balloon dilatation

**Often not desirable – complications of surgery/UTI’s**
- Transurethral resection or incision
- Y-V plasty
- Behavioural therapy ± biofeedback
- Surgical sphincterotomy
- Urethral stent
- Pudendal nerve interruption

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When is it Reasonable to Treat the Outlet in a Man with Detrusor Underactivity?

- When other treatments to control symptoms have failed
- When it is felt that obstruction is the cause of DU or is associated with DU
- When the patient is willing to accept possible complications of treating the outlet knowing a successful outcome may be less certain
  - Understand patient’s expectations
- There is no current treatment for the bladder other then decompression and retest
  - If contractility improves this may change a patient’s mind
  - Sacral neuromodulation is indicated for non-obstructive urinary retention
What are the Goals of Surgery?

• To improve symptoms

• To eliminate the need for catheterization (indwelling or CIC)
  • May still have elevated PVR

• To reduce the frequency of CIC
In patients with equivocal findings (BOOI between 20-39), the urodynamicist made a clinical judgment based on detrusor contraction duration and magnitude and the radiographic appearance of the urethra during voiding.
Surgical treatment of detrusor underactivity: a short term proof of concept study

Jerry G. Blaivas, James C. Forde, Jonathan L. Davila, Lucas Policastro, Michael Tyler, Joshua Aizen, Anand Badri, Rajveer S. Purohit, Jeffrey P. Weiss


<table>
<thead>
<tr>
<th>Parameter</th>
<th>BOO [n=34]</th>
<th>DU [n=62]</th>
<th>DA [n=23]</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PGII success (%)</td>
<td>33/34 (97%)</td>
<td>61/62 (98%)</td>
<td>6/23 (26%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Pre-op need for CIC (%)</td>
<td>16/34 (47%)</td>
<td>20/62 (32%)</td>
<td>20/23 (87%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Post-op need for CIC (%)</td>
<td>0/34 (0%)**</td>
<td>0/62 (0%)**</td>
<td>16/23 (69%)*</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>%Δ in need for CIC</td>
<td>-100%</td>
<td>-100%</td>
<td>-17%</td>
<td>&lt;0.0001</td>
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<tr>
<td>Pre-op Q_max (mL/s)</td>
<td>7.8</td>
<td>4.4</td>
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<td>&lt;0.001</td>
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<tr>
<td>Post-op Q_max (mL/s)</td>
<td>18.9**</td>
<td>15.9**</td>
<td>--</td>
<td>0.07</td>
</tr>
<tr>
<td>Δ Q_max</td>
<td>11.1</td>
<td>11.4</td>
<td>--</td>
<td>0.95</td>
</tr>
<tr>
<td>Pre-op PVR (mL/s)</td>
<td>481.3</td>
<td>380.7</td>
<td>--</td>
<td>0.08</td>
</tr>
<tr>
<td>Post-op PVR (mL/s)</td>
<td>68.5**</td>
<td>78.3**</td>
<td>--</td>
<td>0.32</td>
</tr>
</tbody>
</table>

Limitations:
- How patients get classified if BOOI > 40 and BCI < 100?
- Big difference between BCI = 90 and BCI = 20
Treating the Outlet

• Many studies have shown benefits in treating presumed obstruction in patients with DU\textsuperscript{1-6}
  
• In general most patients are improved (60-98%)

• Some comparative studies patients with normal contractility do better than those with DU\textsuperscript{4} while other show no difference\textsuperscript{5}

Retrospective study of men with BPH and DU (Pdetmax<40 cmH2O) who underwent TURP (24) or HoLEP (32)

Results at 6 months

“Over the course of short-term follow-up, HoLEP and TURP were found to effectively improve postoperative symptom-related outcomes in BPH patients with DU. HoLEP showed better efficacy than TURP in improving voiding symptoms, Qmax, PVR, medication requirements, and in minimizing postoperative complications”
Observational, prospective, randomized study of men with DU without (n= 28) and with BOOI (n=23) undergoing TURP

- Mean BCI = 61 and mean BOOI = 17
- Mean BCI = 76 and mean BOOI = 50

“BOO had an important impact on the degree of improvement of Qmax and PVR/BVE, while had a poor influence on lower urinary tract symptoms amelioration”
Case 1: 87 Year Old Male

- Urinary retention after ORIF Hip after fall

- Retention discovered 2 months post op when creatinine rose to 3.0 from 1.0 – bilateral hydronephrosis with PVR = 1600

- Foley catheter placed and patient failed 2 subsequent TOV
Case 1: 87 Year Old Male

- Seeks alternative to urethral catheter – very uncomfortable
- CIC not practical and patient/wife refuse
- Creatinine normalized
- PMH significant for NPH
  - Had urgency incontinence prior to retention
Case 1: 87 Year Old Male

UDS 6 weeks after initial bladder decompression

Attempt to void x 2

Capacity 350 ml

BOOI = 37
BCI = 37
Case 1: 87 Year Old Male

• Goals of treatment
  • Spontaneous voiding without a catheter

• Surgical Intervention?
  • Of course this depends on relative surgical risk

• Other options
  • Repeat UDS in 3 months to see if contractility is improved
  • Place SP tube at the time of surgery that will allow for trials of void as contractility may improve over time
Case 2: 60 Year Old Male

- Very bothersome LUTS
- Frequency and urgency
- Nocturia x 3
- Slow urinary stream
- Straining to void
- Trial of Tamsulosin – no help
  - Mirabegron and solifenicin added – no help
- LUTS are affecting him a lot, especially at work
Case 2: 60 Year Old Male

- No significant medical history
- PE unremarkable
- Prostate 30 grams
- PSA = 0.6

Uroflow:
- Flattened curve
- Qmax 5.3 ml/s
- VV = 310 ml
- PVR = 45 ml
Q_{\text{max}} = 5 \text{ ml/s}
P_{\text{detQmax}} = 45 \text{ cmH}_2\text{O}
BOOI = 35
BCI = 70
Case 2: 60 Year Old Male

• **Goals of treatment**
  • Improve LUTS
  • Less frequency and urgency and easier bladder emptying

• **Surgical Intervention?**

• **Other options?**
  • Neuromodulation
  • OnabotulinumtoxinA
Case 3: 75 Year Old Male

- Initially had TURP 10 years ago for urinary retention
  - Told bladder was weak, but TURP was successful
- TUI-BN 5 years ago for retention, improved emptying
- 1 year of progressive symptoms after that, found have PVR 700 ml and CIC initiated
- For the past 1 year catheterizing 4-5 times / day, no spontaneous voiding
Case 3: 75 Year Old Male

Attempt to void

Pdetmax = 27 cmH2O
Case 3: 75 Year Old Male

- Cystoscopy – recurrent bladder neck contracture

- Goals of treatment
  - Reduce CIC to twice a day (early am and early pm)

- Surgery (TUI-BN)?
Factors (other than BOOI and BCI) That May Be Important in Predicting Success of Surgery

- Pre op voiding status
- Duration of detrusor contraction
- VUDS appearance of the outlet
- Expectations of surgery
- Feasibility of treatments that treat things other than BOO
Conclusions

• Patients with detrusor underactivity and confirmed or suspected BOO often benefit from surgery to treat BOOI
  • Outcomes may not be quite as good as patient without DU
  • Outcomes likely dependent on patient expectations, response to less aggressive treatments and overall risks of surgery

• In patients with acontractile detrusor who do not normally void (catheter dependent) success is less likely, though surgery can be justified in certain circumstances dependent on patient understanding of outcomes