Endoscopic Management of BPH: What is New in the Urologist’s Toolbox in 2017

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Assistant Professor

June 23, 2017
Disclosures

• None
Non-Pharmacologic Management of BPH

Laser Ablation
- PVP (Greenlight™)
- HoLAP

TUEVP
- Button

TURP
- Monopolar
- Bipolar

Prostatic urethral Lift (UroLift®)

Office based
- TUNA
- TUMT

Simple Prostatectomy
- Open
- Robotic

Laser Enucleation
- HoLEP
- ThuLEP

Convective Water Vapor Energy Ablation (Rezūm®)

PAE

Aquablation
63 yo male with LUTS, retention on CIC
- UDS: Obstruction, Increased capacity, normal compliance
- PSA 9
- TRUS: 120cc prostate, prominent median lobe, 1 core ASAP

1. TURP (staged?)
2. Laser Ablation (PVP Greenlight™, HoLAP)
3. Simple Prostatectomy (Open, Robotic)
4. Laser Enucleation (HoLEP, ThuLEP)
5. Other
52 yo male with LUTS on alpha blocker
- AUASI 18 with bother 3, PVR = 52cc, PSA 1.2
- Concerned with retrograde ejaculation with meds
- 40cc prostate, cysto = lateral hypertrophy, small median lobe

1. TURP
2. Laser Ablation (PVP Greenlight™, HoLAP)
3. TUNA / TUMT
4. Prostate urethral lift / Convective H₂O vapor ablation
5. Other
Non-Pharmacologic Management of BPH

- Laser Ablation
  - PVP (Greenlight™)
  - HoLAP
- TURP
  - Monopolar
  - Bipolar
- TUEVP
  - Button
- Simple Prostatectomy
  - Open
  - Robotic
- Laser Enucleation
  - HoLEP
  - ThuLEP
- Office based
  - TUNA
  - TUMT
- PAE
- Aquablation
- Prostatic urethral Lift (UroLift®)
- Convective Water Vapor Energy Ablation (Rezūm®)
Benign Prostatic Hyperplasia (BPH)

- Non-malignant enlargement of the prostate (transition zone) causing obstructed urine flow, bladder outlet obstruction and LUTS
  - Direct prostatic obstruction
  - Increased smooth muscle tone at bladder neck / prostatic capsule
- Progressive symptoms lead to ↓ QOL and associated anxiety / depression
- If left untreated, can lead to urinary retention, recurrent UTI, hydronephrosis / renal insufficiency or bladder dysfunction
Prevalence and Growth Rate

- Review of 10 independent studies with >1000 prostates
- Normal prostate weight = $20 \pm 6$ grams (by age 30)
- 8% BPH in 40s
- 50% BPH in 50-60s
- BPH weight Doubling time:
  - 4.5 years between 31-50 years old
  - 10 years between 51-70 years old

Economic Impact

• Overall Costs: $4 billion / year
• Incremental cost with BPH: $1536 per patient per year
• Associated with 7.3 hours work loss per patient per year
Medication Treatment of BPH

• Typically first line intervention
• Medication Costs: > $600 million / year (α blocker + 5ARI)
• Adherence variable
  – 4-year persistence of medication = 48%
  – Other studies: Up to 70% discontinue treatment within 1st year
    • Side effects (dizziness, loss of libido, sexual dysfunction)
    • Inadequate symptom relief

Medication Treatment of BPH

- Up to 30% require surgical intervention following failed medication therapy
- 75% ON medication prior to surgery, OFF medication at 4 mo
- Prior medication use (anti-spasmodic) with highest risk of continued or new therapy after surgery
- BPH progression despite meds may lead to bladder dysfunction

2010 BPH AUA Guidelines

• “Surgical intervention is an appropriate treatment alternative for patients with moderate-to-severe LUTS and for patients who have developed AUR or other BPH-related complications”

• “Medical therapy may not be viewed as a requirement because some patients may wish to pursue the most effective therapy as a primary treatment if their symptoms are particularly bothersome”

McVary et al. J Urol 2011; 185:1793
2010 BPH AUA Guidelines

- In addition to open prostatectomy and monopolar TURP, newer techniques include bipolar TURP, HoLEP, PVP, HoLAP, and TUEVP to mechanically debulk tissue within prostatic fossa.

- All (laser) therapies produce major improvements in AUA-SI scores and appear comparable and durable to five years.

McVary et al. J Urol 2011; 185:1793
What is New with Endoscopic Treatment of Large Prostates?
Endoscopic Enucleation of the Prostate

- Endoscopic removal of transition zone along surgical capsule similar to open technique
- Utilizes laser to incise tissue / hemostasis, beak of scope to bluntly develop planes, morcellator for specimen removal
- Laser: Holmium, Thulium
- First described by Gilling (1998)

Endoscopic Enucleation of the Prostate

Endoscopic Enucleation of the Prostate

- Significant utilization worldwide, particularly in Europe / Asia
- 15 RCT evaluating HoLEP
- Outcomes irrespective of prostate size, best for prostate >80cc

Original Article
HoLEP: the gold standard for the surgical management of BPH in the 21st Century

John Michalak, David Tzou, Joel Funk

# HoLEP vs. Open Simple Prostatectomy

<table>
<thead>
<tr>
<th></th>
<th>HoLEP (RCT)</th>
<th>Open</th>
<th>HoLEP (RCT)</th>
<th>Open</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of stay (d)</td>
<td>2.9</td>
<td>10</td>
<td>2.7</td>
<td>5.4</td>
</tr>
<tr>
<td>Catheter time (d)</td>
<td>1.3</td>
<td>8.1</td>
<td>1.5</td>
<td>4.1</td>
</tr>
<tr>
<td>Tissue removed (g)</td>
<td>93.7</td>
<td>96.4</td>
<td>59.3</td>
<td>87.9</td>
</tr>
<tr>
<td>Procedure time (min)</td>
<td>135.9</td>
<td>90.6</td>
<td>72.1</td>
<td>58.3</td>
</tr>
<tr>
<td>Transfusion rate (%)</td>
<td>0</td>
<td>13.3</td>
<td>4</td>
<td>17.9</td>
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<tr>
<td>Hemoglobin loss (gm/dL)</td>
<td>1.9</td>
<td>2.8</td>
<td>2.1</td>
<td>3.1</td>
</tr>
<tr>
<td>Prostate size (g)</td>
<td>&gt; 100</td>
<td>&gt; 100</td>
<td>&gt; 70</td>
<td>&gt; 70</td>
</tr>
<tr>
<td>Change in Qmax</td>
<td>+20.6</td>
<td>+20.7</td>
<td>+11.4</td>
<td>+11.8</td>
</tr>
<tr>
<td>Change in AUASS/IPSS</td>
<td>-19</td>
<td>-18</td>
<td>-12.2</td>
<td>-13.5</td>
</tr>
</tbody>
</table>

## HoLEP vs. TURP

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>HoLEP</strong></td>
<td>HoLEP</td>
<td>HoLEP</td>
<td>HoLEP</td>
<td>HoLEP</td>
</tr>
<tr>
<td><strong>TURP</strong></td>
<td>TURP</td>
<td>TURP</td>
<td>TURP</td>
<td>TURP</td>
</tr>
<tr>
<td><strong>Length of stay (d)</strong></td>
<td>2.2</td>
<td>1.2</td>
<td>2.5</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td><em>p ≤ 0.001</em></td>
<td><em>p ≤ 0.001</em></td>
<td><em>p = 0.001</em></td>
<td>-</td>
</tr>
<tr>
<td><strong>Catheter time (d)</strong></td>
<td>1.1</td>
<td>0.7</td>
<td>1.3</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td><em>p ≤ 0.001</em></td>
<td><em>p ≤ 0.01</em></td>
<td><em>p = 0.001</em></td>
<td><em>p = 0.001</em></td>
</tr>
<tr>
<td><strong>Tissue removed (g)</strong></td>
<td>32.6</td>
<td>40.4</td>
<td>36.1</td>
<td>17.2</td>
</tr>
<tr>
<td></td>
<td><em>p ≤ 0.05</em></td>
<td><em>p ≤ 0.01</em></td>
<td><em>p = 0.001</em></td>
<td><em>p ≤ 0.004</em></td>
</tr>
<tr>
<td><strong>Procedure time (min)</strong></td>
<td>94.6</td>
<td>62.1</td>
<td>74</td>
<td>75.4</td>
</tr>
<tr>
<td></td>
<td><em>p = 0.001</em></td>
<td><em>p = 0.001</em></td>
<td><em>p ≤ 0.05</em></td>
<td><em>p ≤ 0.001</em></td>
</tr>
<tr>
<td><strong>Transfusion rate (%)</strong></td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td><em>p = 0.001</em></td>
<td></td>
<td></td>
<td>p = 0.001</td>
</tr>
<tr>
<td><strong>Blood loss (mL)</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>40.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>140.5</td>
</tr>
</tbody>
</table>

HoLEP vs. TURP

5-10 year Retreatment rates:
HoLEP <1%
TURP 7.4%

AUASI
Qmax
PVR

HoLEP vs. PVP

- 103 patients randomized to HoLEP vs. 180W PVP

Preop Prostate Volume 40-150cc

Intraop Conversion to TURP:
  - HoLEP 4%
  - PVP 25%

Mean ↓ TRUS Prostate size at 4mo
  - HoLEP 74% (p<0.001)
  - PVP 43%

17% PVP required > 1 fiber

Retreatment in 1 yr
  - HoLEP 0%
  - PVP 4%

Elsal et al. J Urol 2015;193:927
Endoscopic Enucleation of the Prostate

Post-operative Retrograde ejaculation: 74-78%

Endoscopic Enucleation of the Prostate

Holmium Laser Enucleation of the Prostate in Patients Requiring Anticoagulation
Marawan M. El Tayeb, MD,1 Joseph M. Jacob, MD,2 Naeem Bhojani, MD,3 Elaine Bammerlin, MD,1 and James E. Lingeman, MD3

Long-term Efficacy of Holmium Laser Enucleation of the Prostate in Patients With Detrusor Underactivity or Acontractility
Derek J. Lomas and Amy E. Krambeck

Holmium Laser Enucleation of the Prostate for Persistent Lower Urinary Tract Symptoms After Prior Benign Prostatic Hyperplasia Surgery
Christopher D. Jaeger and Amy E. Krambeck

Comparison of Holmium Laser Prostate Enucleation Outcomes in Patients with or without Preoperative Urinary Retention
Niels V. Johnson, Trisha J. Kammann, Tracy Marien, Ryan B. Pickens and Nicole L. Miller*

Holmium Laser Enucleation of the Prostate Is Safe in Patients with Prostate Cancer and Lower Urinary Tract Symptoms—A Retrospective Feasibility Study
Andreas Becker, MD1,2 Anne Placke, MD1,2 Luis Kluth, MD1, Rudolf Schwarz, MD,3 Hendrik Isbarn, MD1, Felix Chun, MD1, Roman Heuer, MD1, Thorsten Schlomm, MD2 Daniel Seiler, MD,4 Oliver Engel, MD,1 Marit Fisch, MD1 Markus Graefen, MD1,2 and Sascha A. Ahval, MD1

Safety and feasibility of concomitant surgery during holmium laser enucleation of the prostate (HoLEP)
Amar Patel · Rafael Nunez · Chinedu O. Mmeje · Mitchell R. Humphreys

Overcoming the Learning Curve

• Prospective Observation of 8 Centers Beginning HoLEP
  – Education, 2 cases mentored then evaluated next 20 cases
  – Objective: 4 consecutive cases completed within 90 min, no TURP, acceptable stress, acceptable difficulty
  – 3 centers stopped due to complications
  – 44% cases overall successful; objective achieved by only 1 center

• Dedicated Mentorship / Simulation program
  – Appropriate patient selection
  – 20-30 cases vs. 40-60 cases if self taught
  – Expect slow enucleation rate early on

Robert et al. BJU Int 2016;117(3):495
What is New with Endoscopic Treatment of Small Prostates?
Prostatic Urethral Lift (UroLift®)

- Endoscopic placement of small permanent intraprostatic implants to mechanically correct / “tack” BOO without tissue destruction
  - FDA approved in 2013

McNicholas et al. Eur Urol 2013;64:292
Prostatic Urethral Lift (UroLift®)

• Indications
  – Bothersome LUTS
  – Desire to be “off medication”
  – Prostate volume < 80cc

• Exclusions
  – Obstructing median lobe (requires cystoscopic confirmation)
  – High riding bladder neck relative contraindication

McNicholas et al. Eur Urol 2013;64:292
Prostatic Urethral Lift (UroLift®)

- Outpatient Procedure
  - Office or OR based
  - Local, MAC, General anesthesia
  - +/- Postop catheter
  - MRI compliant under select conditions
  - “Relieves obstruction while maintaining bladder neck for ejaculatory function”

McNicholas et al. Eur Urol 2013;64:292
Implants placed anterolateral, away from NVB, and DVC

McNicholas et al. Eur Urol 2013;64:292
The L.I.F.T Study

- 19 centers (14 USA, 3 Australia, 2 Canada)
- 206 subjects
- 2:1 Randomization Prostatic Urethral Lift vs. Sham

3 Month ITT Analysis:
AUASI reduction for PUL was at least 25% greater than control
(p = 0.003)

Result: 88% Better

Roehrborn et al. J Urol 2013;190:2162
The L.I.F.T Study: 5 year results

Durable 10 point ↓ in AUASI (p<0.0001)

Durable 2.4 point ↓ in QoL (p<0.0001)

Durable modest ↑ in Qmax (p<0.0001)

No Δ in PVR

0% De novo sustained ejaculatory or erectile dysfunction

13.6% Retreatment Rate through 5 yrs
  - 4.3% repeat PUL
  - 9.3% TURP/PVP

2-3% / yr ReTx rate

Roehrborn et al. AUA Meeting 2017
Prostatic Urethral Lift (UroLift®)

- Meta-analysis of 10 articles with 6 different cohorts
- 50% postop catheter (1 day)
- Implant encrustation (2.1%) when exposed to bladder

Convective Water Vapor Ablation (Rezūm®)

- Endoscopic delivery of targeted, precise thermal treatment of sterile water vapor injected into prostate via convection resulting in cell membrane disruption and tissue necrosis
  - FDA approved in 2015

### Conduction vs. Convection

<table>
<thead>
<tr>
<th></th>
<th>Conduction</th>
<th>Convection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat transfer through:</td>
<td>Direct contact due to temperature difference (requires more time to deposit large energy for effect)</td>
<td>Movement of molecules within fluid due to density differences (uniform mass energy release)</td>
</tr>
<tr>
<td>BPH Utilization</td>
<td>TUNA / TUMT</td>
<td>Water Vapor Ablation (Rezūm®)</td>
</tr>
</tbody>
</table>

![Diagram illustrating Conduction, Convection, and Radiation](image-url)
Convective Water Vapor Ablation (Rezūm®)

- Indications
  - Bothersome LUTS
  - Prostate volume 30 - 80cc
  - Prominent median lobe or elevated bladder neck not a contraindication

McNicholas et al. Eur Urol 2013;64:292
Convective Water Vapor Ablation (Rezūm®)

- Outpatient Procedure
  - Office or OR based
  - Local, sedation, prostate block
  - 1-3 injections into each lateral lobe, 1-2 injections into median lobe
  - 9 seconds injection duration
  - Utilizes standard 30° lens/scope
  - +/- Postop catheter
Convective Water Vapor Ablation (Rezūm®)

- Relative uniform distribution
  - Mass transfer of 540 cal/ml H₂O energy released as vapor disperses through tissue interstices
  - Treatment restricted by zonal anatomy of prostate (collagen pseudocapsule) without compromise to bladder, rectum, sphincter

Mynderse et al. Urology 2015;86:122
Rezūm II Study

• 15 US centers
• 197 subjects
• 2:1 Randomization Rezūm vs. Sham

3 Month ITT Analysis:
AUASI reduction for Rezūm was at least 25% greater than control
(p < 0.0001)

Rezūm II Study: 2 year results

- Durable 11 point ↓ in AUASI (p<0.0001)
- Durable 2.3 point ↓ in QoL (p<0.0001)
- Durable modest ↑ in Qmax (p<0.0001)
- No ∆ in PVR
- 0% De novo sustained erectile dysfunction, 6% diminished ejaculatory function
- 2.2% ReTx at 1yr
- 4.4% ReTx at 2yr

Roehrborn et al. J Urol 2017;197:1507
## Convective Water Vapor Ablation (Rezūm®)

<table>
<thead>
<tr>
<th>Event</th>
<th>Thermal Treatment Group 0–3 Mos</th>
<th>Control Group 0–3 Mos</th>
<th>Thermal Treatment Group Greater than 3–12 Mos</th>
<th>No. Events</th>
<th>No. Subjects (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serious AEs</td>
<td>8</td>
<td>0</td>
<td>11</td>
<td>5 (5.1%)</td>
<td></td>
</tr>
<tr>
<td>Related serious AEs</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3 (1.5%)</td>
<td></td>
</tr>
<tr>
<td>All nonserious AEs</td>
<td>164</td>
<td>27</td>
<td>50</td>
<td>59 (34.3%)</td>
<td></td>
</tr>
<tr>
<td>Related AEs:</td>
<td>138</td>
<td>11</td>
<td>10</td>
<td>52 (38.2%)</td>
<td></td>
</tr>
<tr>
<td>Dysuria</td>
<td>23</td>
<td>1</td>
<td>1</td>
<td>23 (16.9%)</td>
<td></td>
</tr>
<tr>
<td>Hematuria, gross</td>
<td>16</td>
<td>1</td>
<td>1</td>
<td>16 (11.3%)</td>
<td></td>
</tr>
<tr>
<td>Hematospermia</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>10 (7.4%)</td>
<td></td>
</tr>
<tr>
<td>Urinary frequency</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>8 (5.9%)</td>
<td></td>
</tr>
<tr>
<td>Urinary urgency</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>8 (5.9%)</td>
<td></td>
</tr>
<tr>
<td>Decrease in ejaculatory vol</td>
<td>4</td>
<td>0</td>
<td>3</td>
<td>4 (2.9%)</td>
<td></td>
</tr>
<tr>
<td>Urinary retention</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>5 (3.7%)</td>
<td></td>
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<tr>
<td>UTI, suspected</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>6 (3.7%)</td>
<td></td>
</tr>
<tr>
<td>Anospermia</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4 (2.9%)</td>
<td></td>
</tr>
<tr>
<td>Epididymitis</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4 (2.9%)</td>
<td></td>
</tr>
<tr>
<td>UTI, culture proven</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4 (2.9%)</td>
<td></td>
</tr>
<tr>
<td>Pain/discomfort, pelvic</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4 (2.9%)</td>
<td></td>
</tr>
</tbody>
</table>

- 90% postop catheter (3.4 day)

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Aquablation

- Combination automated endoscopic delivery of high velocity heat-free waterjet to ablate the prostate using real-time transrectal ultrasound image guidance
  - Not yet FDA approved
  - First described by Gilling in 2016
- Median lobe not contraindication

Aquablation

- Requires focal cautery for hemostasis

Gilling et al. BJU Int 2016;117:923
Aquablation

Aquablation: 2 year results

- 21 patients
- Mean volume 57.2ml (30-102)
- Aqua Rx time 5 min (3-15)

- Vol Reduction 34% (35-53 ml)
- No urinary incontinence, erectile / ejaculatory dysfunction

Gilling et al. AUA Meeting 2017
Aquablation: WATER Study

- 17 centers (12 USA, 3 UK, 2 Australia)
- 181 subjects
- 2:1 Randomization Aquablation vs. TURP
- Reported 3mo safety and 6mo efficacy

Roehrborn et al. Late Breaking Abstract, AUA Meeting 2017
Summary

• LUTS due to BPH very common in older men
• Surgery warranted if fails medical therapy or develops BPH related complications though indications may be changing
• Prostate enucleation is new endoscopic standard for large prostates
• New options for smaller prostates may offer less invasiveness with better sexual side effects