

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

Office based

- TUNA
- TUMT

PAE

Aquablation

TUEVP

- Button

TURP

- Monopolar
- Bipolar

Prostatic urethral
Lift (UroLift®)

Simple Prostatectomy

- Open
- Robotic

Laser Enucleation

- HoLEP
- ThuLEP

Convective Water
Vapor Energy Ablation
(Rezūm®)



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

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(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 ± 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

Berry et al. J Urol 1984; 132:474.

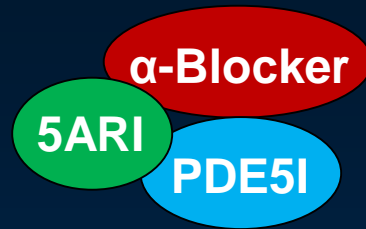


Economic Impact

- 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

Taub and Weil. Curr Urol Rep 2006; 7:272.

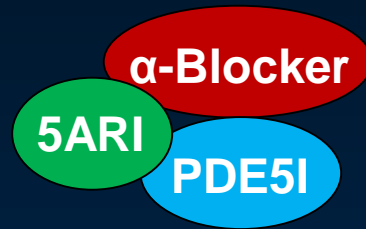
Medication Treatment of BPH



- 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

Taub and Weil. Curr Urol Rep 2006;7:272
Shortridge et al. Am J Mens Health 2015;11:164
Cindolo et al. Eur Urol 2015;68:418
Koh et al. Int J Clin Pract 2014;68:197

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

Roehrborn. Rev Urol 2008; 10:14.
Strope et al. Urology 2015;86:1115.

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

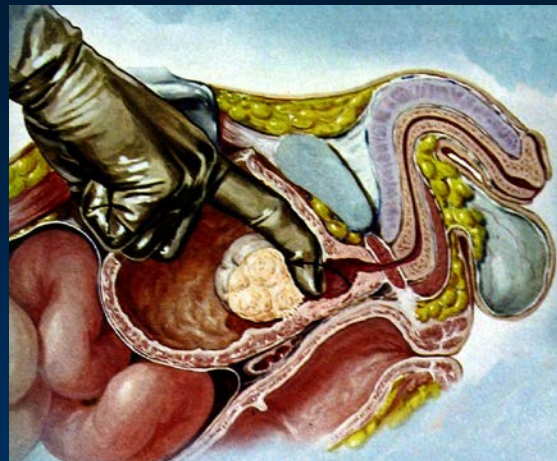
McVary et al. J Urol 2011; 185:1793



What is New with Endoscopic Treatment of Large Prostates?

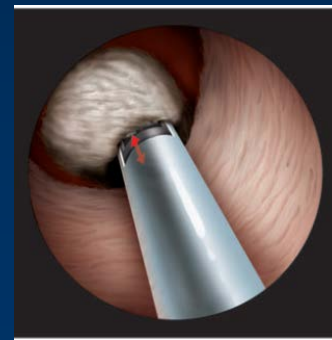
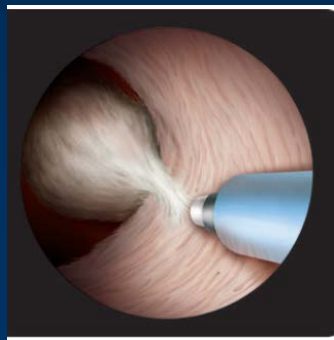
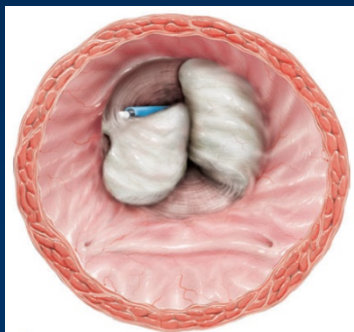
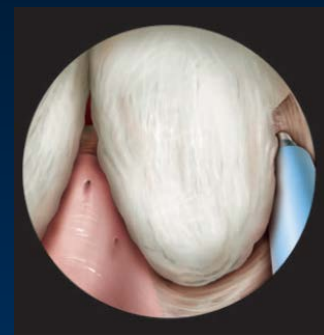
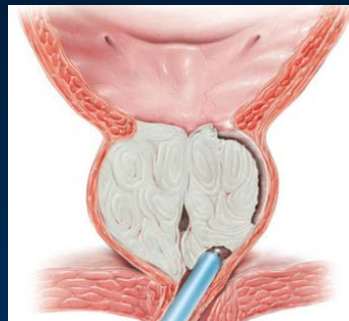
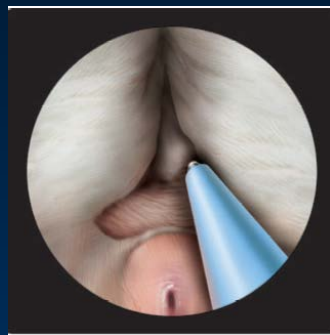
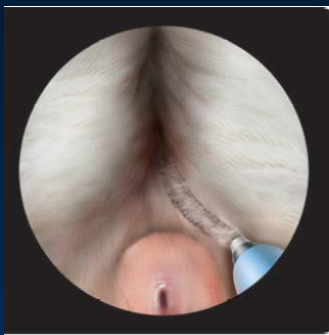
Endoscopic Enucleation of the Prostate

- 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)



Fraundorfer and Gilling. Eur Urol 1998;33(1):69

Endoscopic Enucleation of the Prostate



Gilling. BJU Int 2008; 101:131.



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*

Michalak, Tzou, Funk. Am J Clin Exp Urol 2015;3:36

HoLEP vs. Open Simple Prostatectomy

HoLEP



	Kuntz, et al 2008 [9] (RCT)		Naspro, et al 2006 [14] (RCT)	
	HoLEP	Open	HoLEP	Open
Length of stay (d)	2.9	10	2.7	5.4
	$p \leq 0.0001$		$p \leq 0.0001$	
Catheter time (d)	1.3	8.1	1.5	4.1
	$p \leq 0.0001$		$p \leq 0.0001$	
Tissue removed (g)	93.7	96.4	59.3	87.9
				$p = 0.005$
Procedure time (min)	135.9	90.6	72.1	58.3
		$p \leq 0.0001$		$p \leq 0.0001$
Transfusion rate (%)	0	13.3	4	17.9
	$p = 0.003$		$p \leq 0.007$	
Hemoglobin loss (gm/dL)	1.9	2.8	2.1	3.1
	$p \leq 0.0001$		$p = 0.007$	
Prostate size (g)	> 100	> 100	> 70	> 70
Change in Qmax	+20.6	+20.7	+11.4	+11.8
Change in AUASS/IPSS	-19	-18	-12.2	-13.5

Open



Michalak, Tzou, Funk. Am J Clin Exp Urol 2015;3:36

HoLEP vs. TURP

HoLEP

TURP

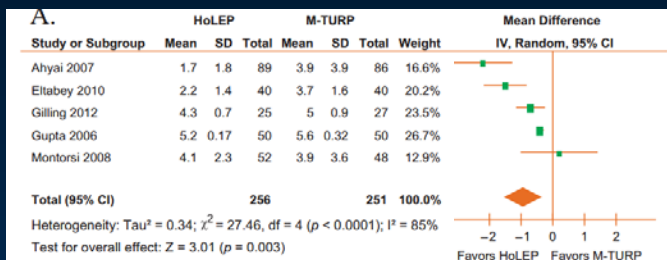
	Kuntz, et al 2004 [12] (RCT)		Gilling, et al 2012 [13] (RCT)		Montorsi et al 2004 [25] (RCT)		Gupta et al 2006 [26] (RCT)	
	HoLEP	TURP	HoLEP	TURP	HoLEP	TURP	HoLEP	TURP
Length of stay (d)	2.2 <i>p</i> ≤ 0.001	3.6	1.2 <i>p</i> ≤ 0.001	2.1	2.5 <i>p</i> = 0.001	3.6	-	-
Catheter time (d)	1.1 <i>p</i> ≤ 0.001	1.8	0.7 <i>p</i> ≤ 0.01	1.9	1.3 <i>p</i> = 0.001	2.4	1.2 <i>p</i> = 0.001	1.9
Tissue removed (g)	32.6	37.2	40.4 <i>p</i> ≤ 0.05	24.7	36.1 <i>p</i> ≤ 0.05	25.4	17.2	24.2 <i>p</i> ≤ 0.004
Procedure time (min)	94.6	73.8 <i>p</i> = 0.001	62.1	33.1 <i>p</i> = 0.001	74	57 <i>p</i> ≤ 0.05	75.4	62.6 <i>p</i> ≤ 0.001
Transfusion rate (%)	0	2	0	3	0	2	0	2
Blood loss (mL)	-	-	-	-	-	-	40.6 <i>p</i> = 0.001	140.5



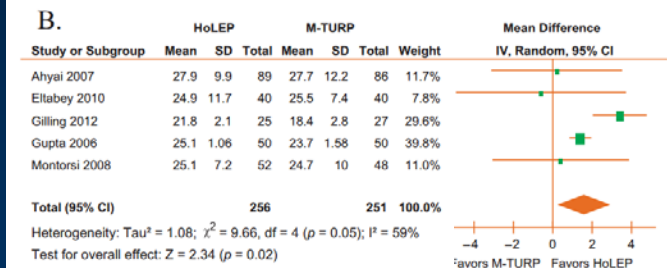
Michalak, Tzou, Funk. Am J Clin Exp Urol 2015;3:36

HoLEP vs. TURP

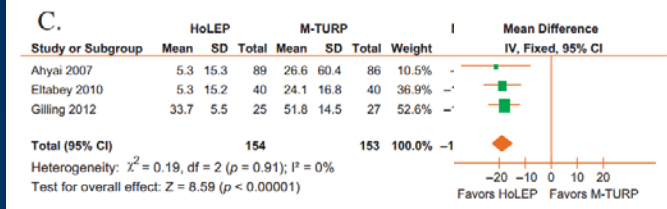
AUASI



Qmax



PVR

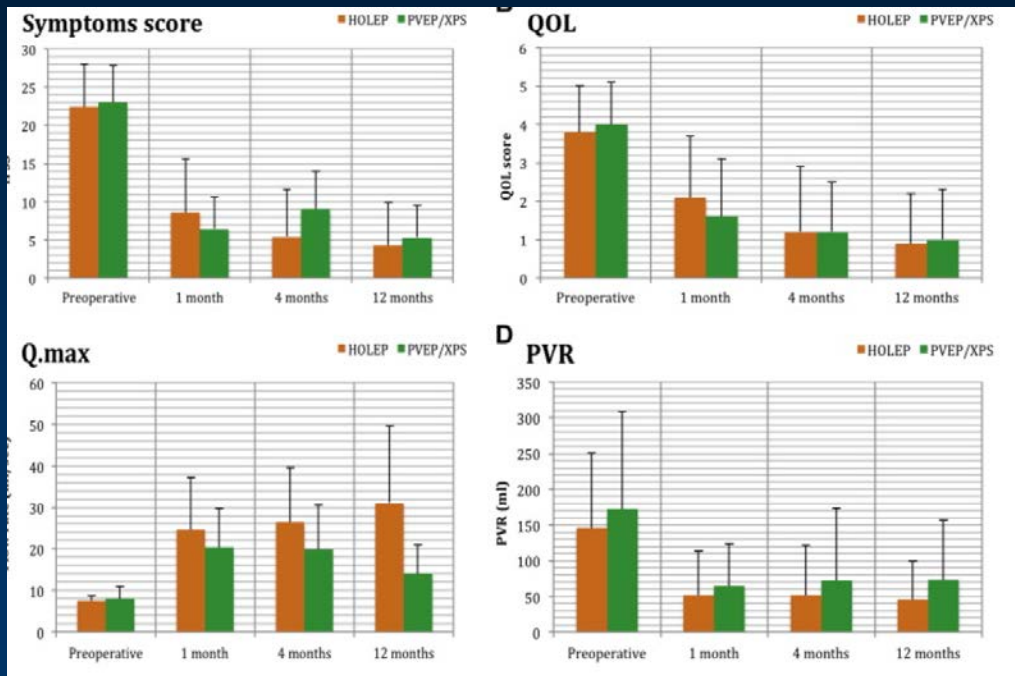


5-10 year Retreatment rates:
 HoLEP <1%
 TURP 7.4%

Cornu et al. Eur Urol 2015;67:1066
 Madersbacher et al. Eur Urol 2005;47:499

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

Table 4 Perioperative complications

	No. of pts.	Capsular perforation (%)	Transfusion (%)	Bladder injury (%)	UTI (%)
Elzayat [28]	118		1.7	0.8	1.7
Placer [29]	125	10.4	0.8	4	2.4
Krambeck [16]	1,065			0.1 (excluding superficial)	0.1 (sepsis only)
Elmansy [17]	949		0.4	0.7	

Table 5 Post-operative complications

	No. of pts.	Failed TOV (%)	Persistent incontinence (SUI and UUI) (>3 months) (%)	Reoperation (%)	Stricture/bladder neck contracture (%)
Placer [29]	125	4	4.8	0.8	5.6
Krambeck [16]	1,065		4.8	0.1	2.6
Elzayat [28]	118	1.7	2.5	4.2 (1.5 late group)	1.47
Elmansy [17]	949		1.5	0.7	2.4

Post-operative Retrograde ejaculation: 74-78%

Vincent and Gilling. World J Urol 2015;33:487

Marien, Kadihasanoglu, Miller. Res Rep Urol 2016;8:181



Endoscopic Enucleation of the Prostate

Holmium Laser Enucleation of the Prostate in Patients Requiring Anticoagulation

Marawan M. El Tayeb, MD¹; Joseph M. Jacob, MD²; Naeem Bhojani, MD³; Elaine Bammerlin, MD⁴; and James E. Lingeman, MD²

Comparison of Holmium Laser Prostate Enucleation Outcomes in Patients with or without Preoperative Urinary Retention

Niels V. Johnsen, Trisha J. Kammann, Tracy Marien, Ryan B. Pickens and Nicole L. Miller*

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 Is Safe in Patients with Prostate Cancer and Lower Urinary Tract Symptoms—A Retrospective Feasibility Study

Andreas Becker, MD^{1,2*}; Anne Placke, MD^{1*}; Luis Kluth, MD¹; Rudolf Schwarz, MD³; Hendrik Isbarn, MD¹; Felix Chun, MD¹; Roman Heuer, MD¹; Thorsten Schlomm, MD²; Daniel Seiler, MD⁴; Oliver Engel, MD¹; Margit Fisch, MD¹; Markus Graefen, MD^{1,2}; and Sascha A. Ahyai, MD¹

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

Safety and feasibility of concomitant surgery during holmium laser enucleation of the prostate (HoLEP)

Amar Patel · Rafael Nunez · Chinedu O. Mmeje · Mitchell R. Humphreys

Tayeb et al. J Endourol 2016;30(7):805 Johnson et al. J Urol 2016;195(4):1021 Lomas and Krambeck. Urology 2016;97:208
Becker et al. J Endourol 2014;28(3):335 Jaeger and Krambeck. Urology 2013;81(5):1025 Patel et al. World J Urol 2014; 32(6):1543



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

Vincent and Gilling. World J Urol 2015;33:487

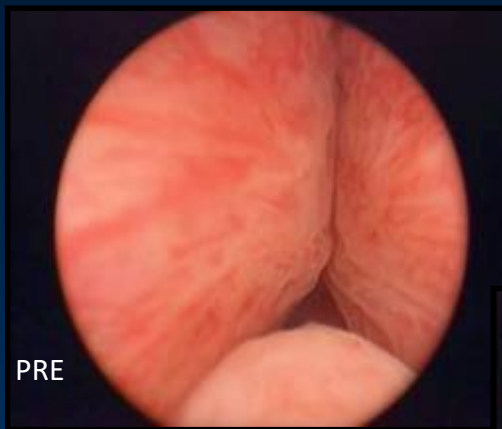


What is New with Endoscopic Treatment of Small Prostates?



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



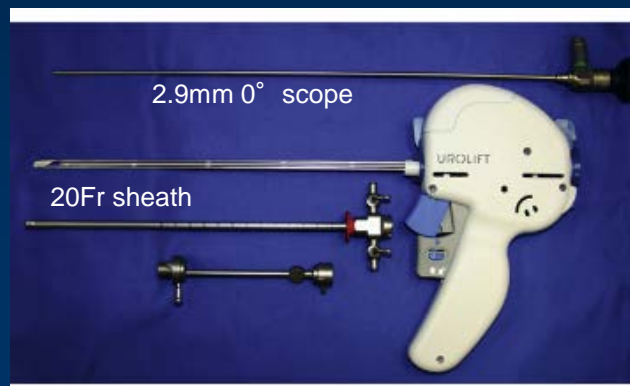
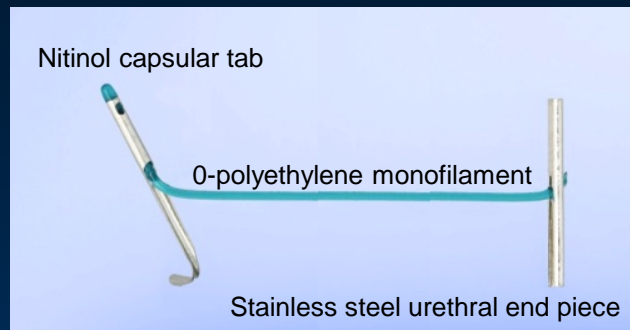
Prostatic Urethral Lift (UroLift®)

- 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

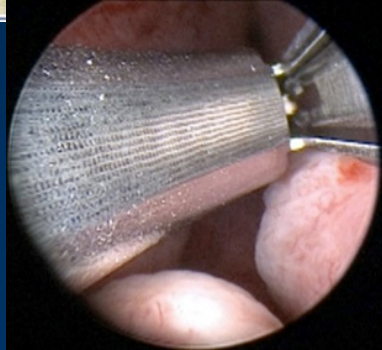
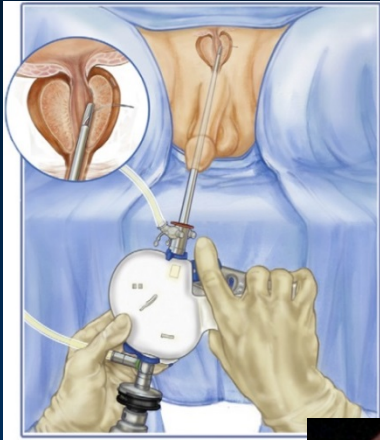
Prostatic Urethral Lift (UroLift®)

- 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”

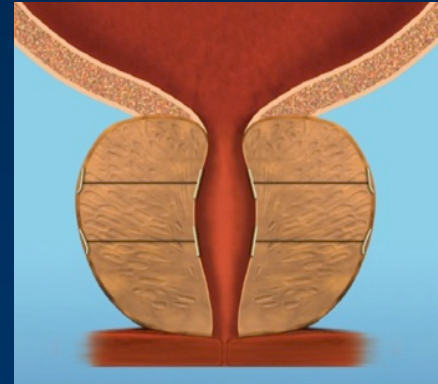
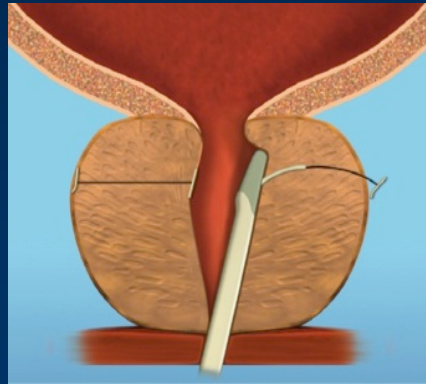
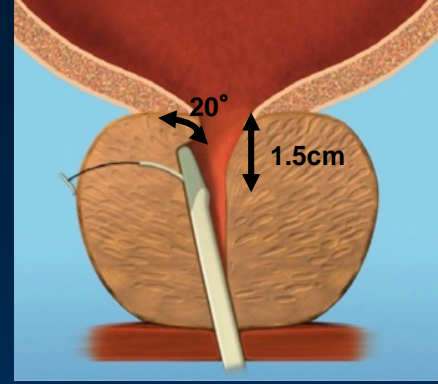
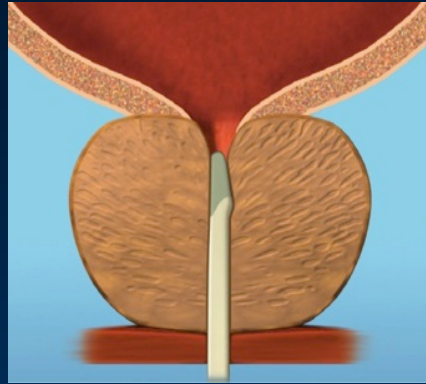


McNicholas et al. Eur Urol 2013;64:292

Prostatic Urethral Lift (UroLift®)



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

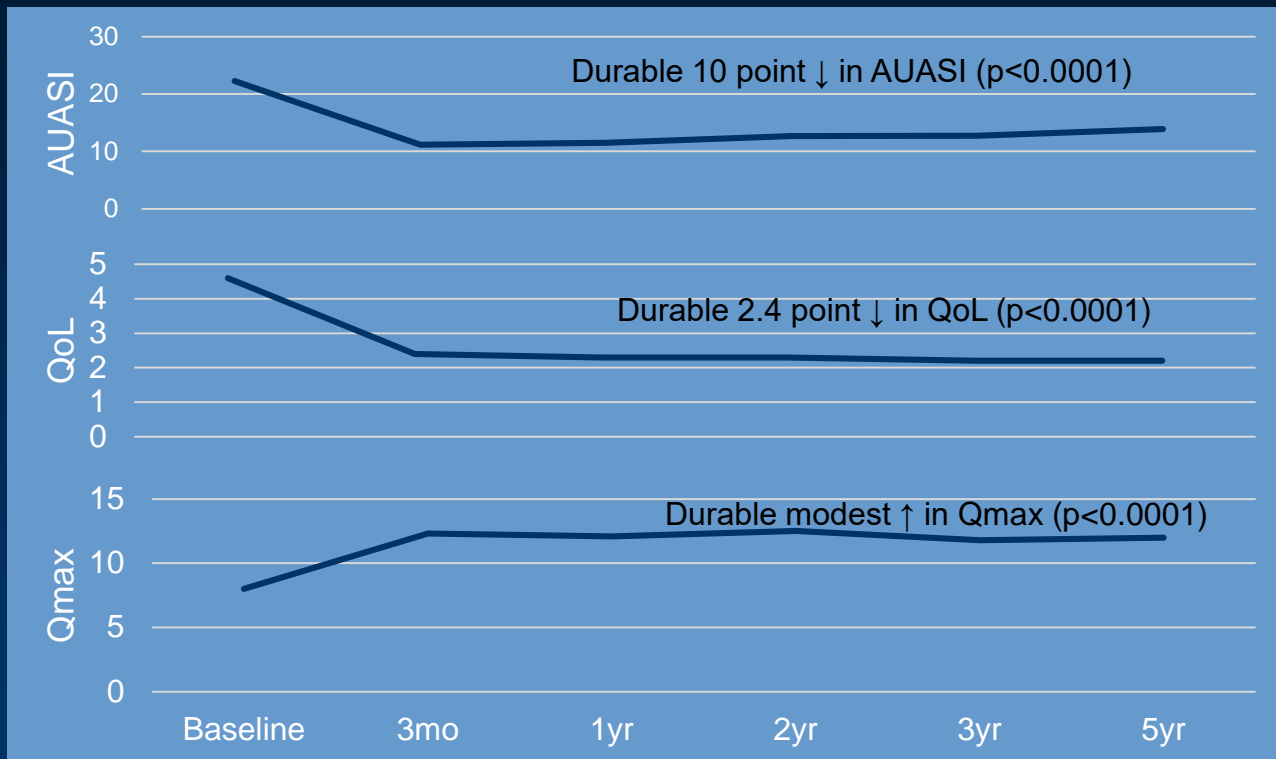
3 Month ITT Analysis:

AUASI reduction for PUL was at least 25% greater than control
($p = 0.003$)





The L.I.F.T Study: 5 year results



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. Can J Urol 2015;22:7772
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

Postoperative catheter	Early postoperative complications				
	Dysuria	Haematuria	Pelvic pain	UTI	Incontinence
NR	14/20 (70)	6/20 (30)	NR	NR	0/20
26/53 (49)	19/53 (36)	14/53 (26)	11/53 (21)	1/53 (2)	2/53 (3.8)
4/4 (100)	0/4 (0)	1/4 (25)	0/4 (0)	0/4 (0)	0/4 (0)
72/140 (51)	48/140 (34)	36/140 (26)	25/140 (18)	4/140 (2.9)	5/140 (3.6)
72/137 (53)	NR	NR	NR	NR	NR
10/51 (20)	27/51 (53)	38/51 (75)	8/51 (16)	NR	2/51 (4)
43/102 (42)	25/102 (25)	16/102 (16)	NR	3/102 (3)	NR
34/64 (53)	NR	NR	NR	7/64 (11)*	5/64 (8)
NR	NR	NR	NR	NR	NR
11/19 (58)	11/19 (58)	12/19 (63)	1/19 (5)	3/19 (10) [†]	3/19 (16)

Convective Water Vapor Ablation(Rezūm®)

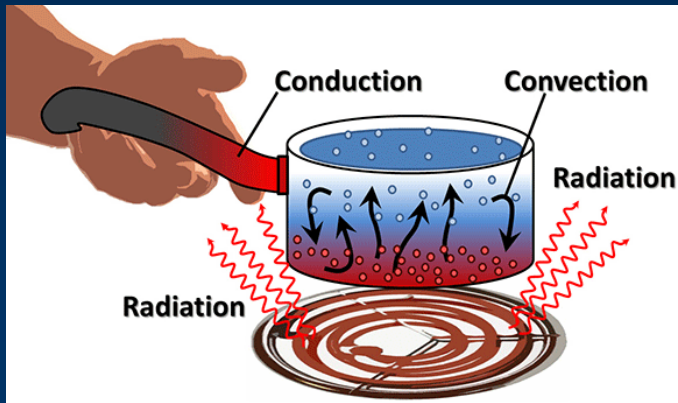


- Endoscopic delivery of targeted, precise thermal treatment of sterile water vapor injected into prostate via convection resulting in cell membrane disruption and tissue necrosis
 - FDA approved in 2015

Rukstalis. Can J Urol 2015; 22(Suppl 1):67.

Convective Water Vapor Ablation(Rezūm®)

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



Convective Water Vapor Ablation(Rezūm®)

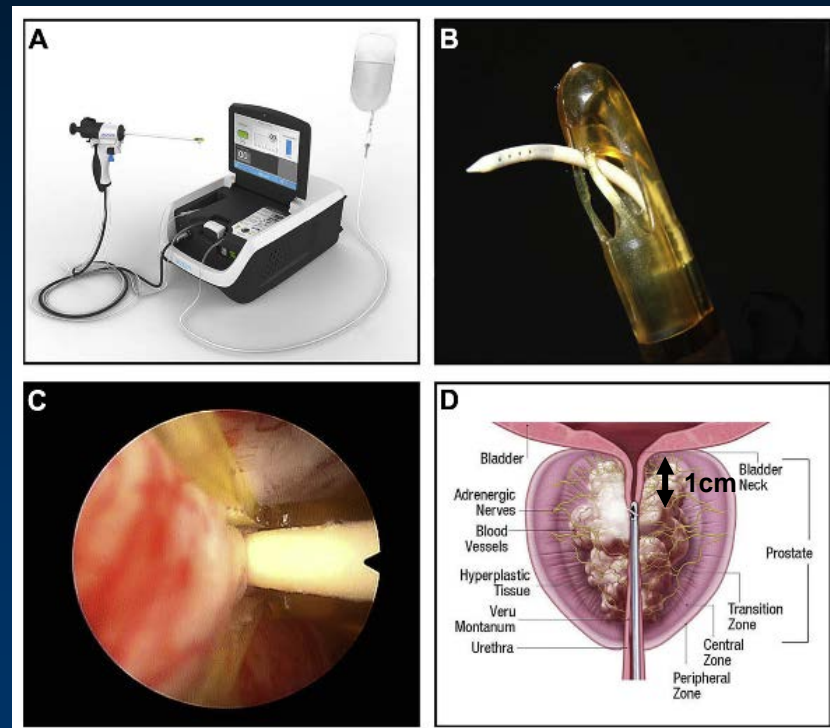


- Indications
 - Bothersome LUTS
 - Prostate volume 30 - 80cc
 - Prominent median lobe or elevated bladder neck not a contraindication

McNicholas et al. Eur Urol 2013;64:292

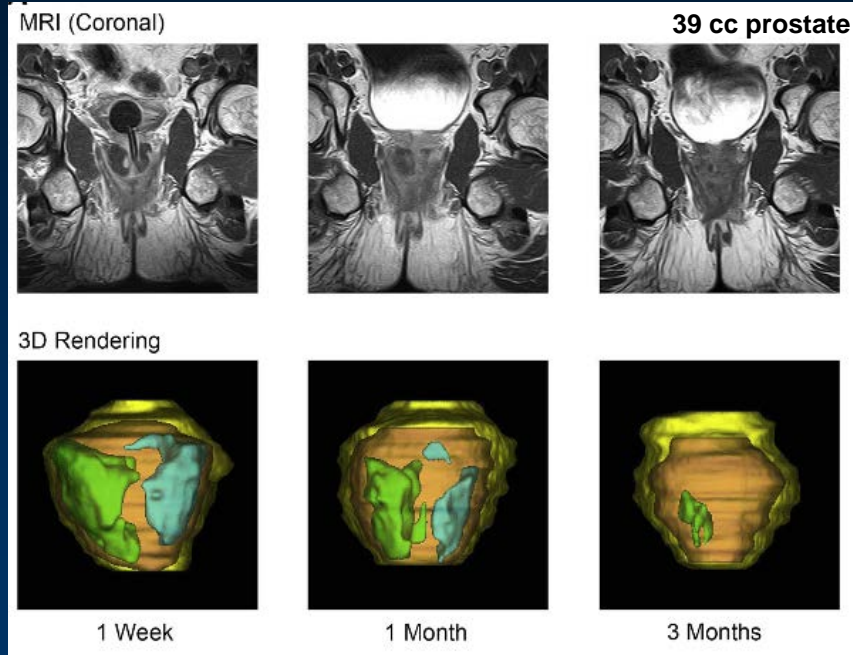
Convective Water Vapor Ablation(Rezūm®)

- 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

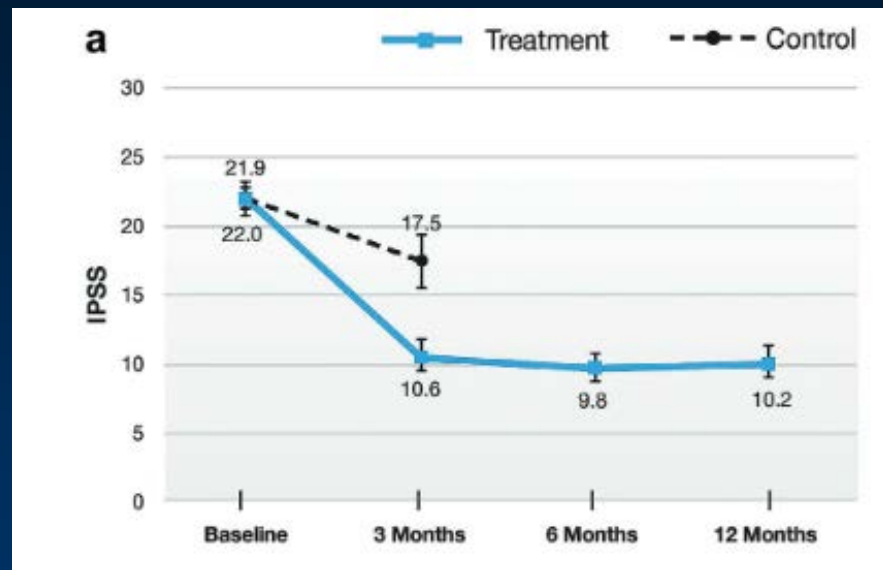


Rezūm II Study

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

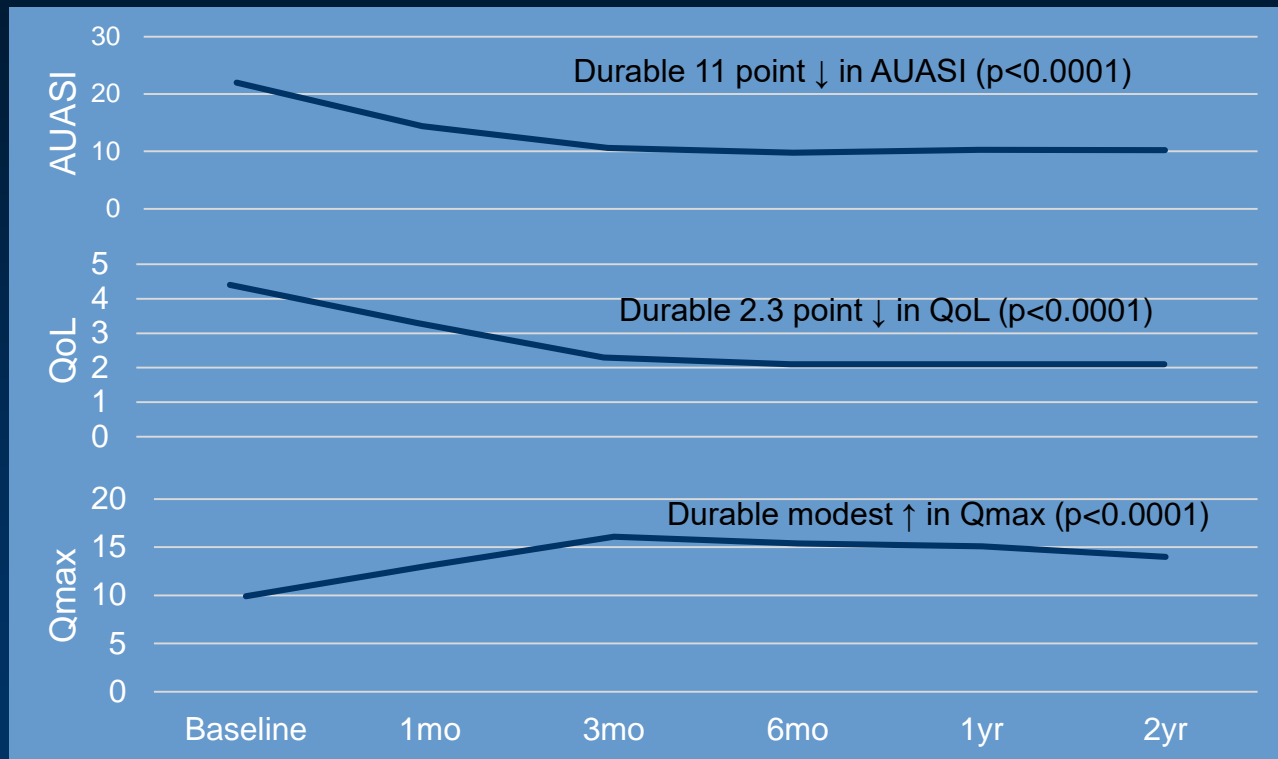
3 Month ITT Analysis:

AUASI reduction for Rezūm was at least 25% greater than control ($p < 0.0001$)





Rezūm II Study: 2 year results



No Δ 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
McVary et al. J Sex Med 2016;13:924

Convective Water Vapor Ablation(Rezūm®)

	Thermal Treatment Group 0–3 Mos		Control Group 0–3 Mos		Thermal Treatment Group Greater than 3–12 Mos	
	No. Events	No. Subjects (%)	No. Events	No. Subjects (%)	No. Events	No. Subjects (%)
Serious AEs	8	7 (5.1)	0	0 (0)	11	9 (6.6)
Related serious AEs	3	2 (1.5)	0	0 (0)	0	0 (0)
All nonserious AEs	164	59 (43.4)	27	14 (23)	50	29 (21.3)
Related AEs:	138	52 (38.2)	11	6 (9.8)	10	8 (5.9)
Dysuria	23	23 (16.9)	1	1 (1.6)	1	1 (0.7)
Hematuria, gross	16	16 (11.8)	0	0 (0)	0	0 (0)
Hematospermia	10	10 (7.4)	0	0 (0)	0	0 (0)
Urinary frequency	8	8 (5.9)	0	0 (0)	0	0 (0)
Urinary urgency	8	8 (5.9)	0	0 (0)	0	0 (0)
Decrease in ejaculatory vol	4	4 (2.9)	0	0 (0)	3	2 (1.5)
Urinary retention	5	5 (3.7)	0	0 (0)	0	0 (0)
UTI, suspected	6	5 (3.7)	0	0 (0)	0	0 (0)
Anejaculation	4	4 (2.9)	0	0 (0)	0	0 (0)
Epididymitis	4	4 (2.9)	1	1 (1.6)	0	0 (0)
UTI, culture proven	4	4 (2.9)	0	0 (0)	0	0 (0)
Pain/discomfort, pelvic	4	4 (2.9)	0	0 (0)	0	0 (0)

- 90% postop catheter (3.4 day)

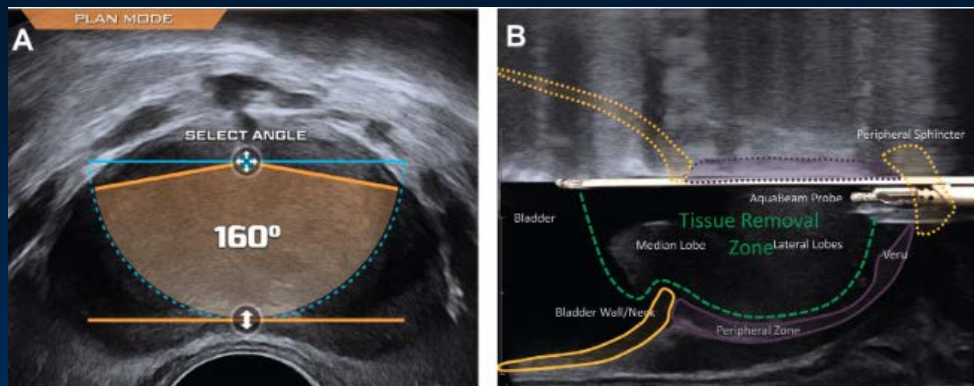


Aquablation

- 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

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

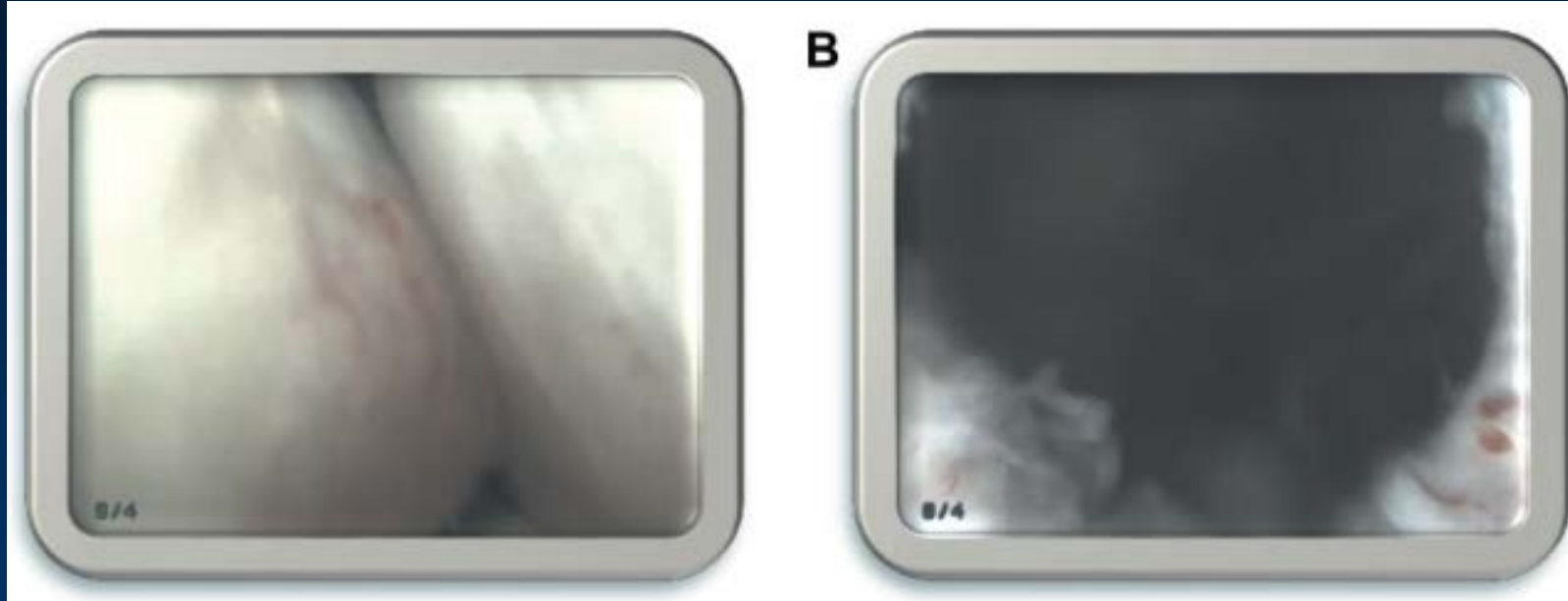
Aquablation



- Requires focal cautery for hemostasis

Gilling et al. BJU Int 2016;117:923
 Gilling, Anderson, Tan. J Urol 2017;197:1565

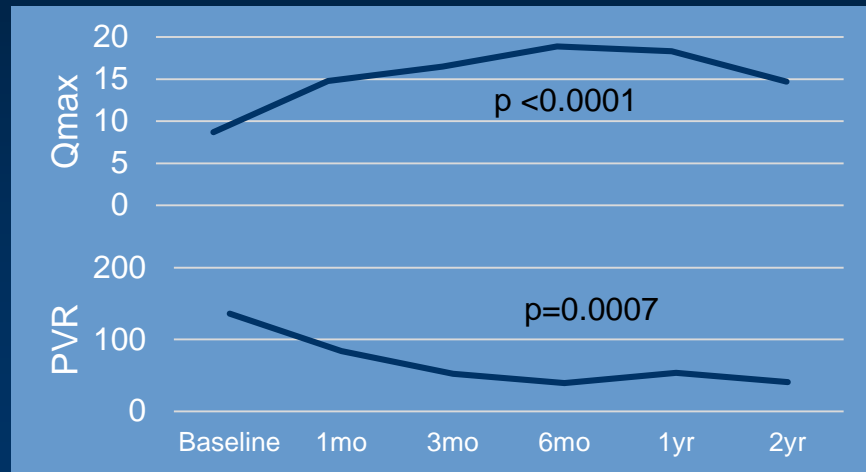
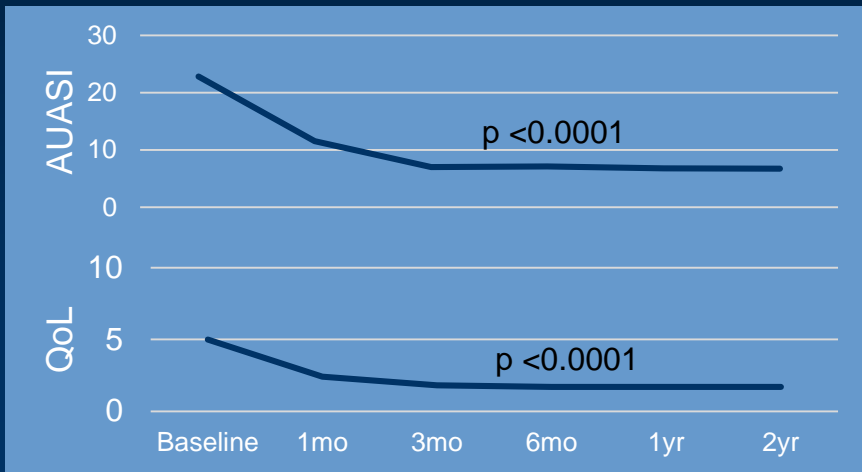
Aquablation



Gilling, Anderson, Tan. J Urol 2017;197:1565

Aquablation: 2 year results

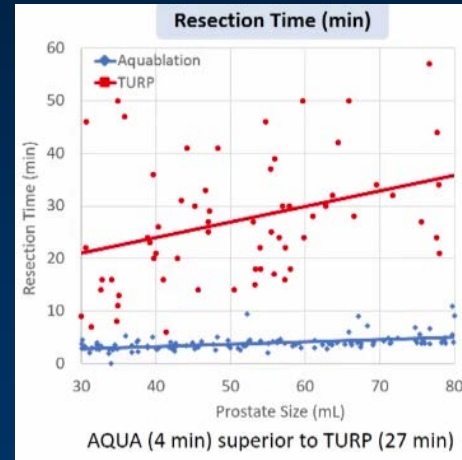
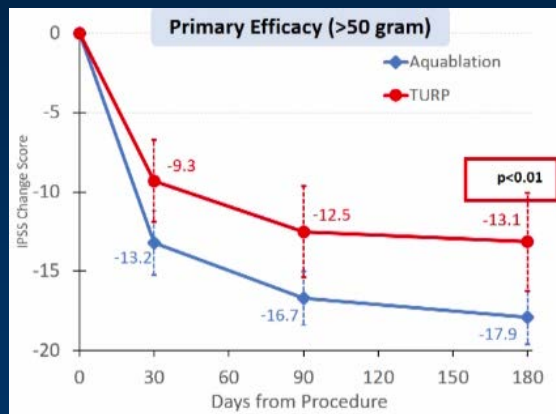
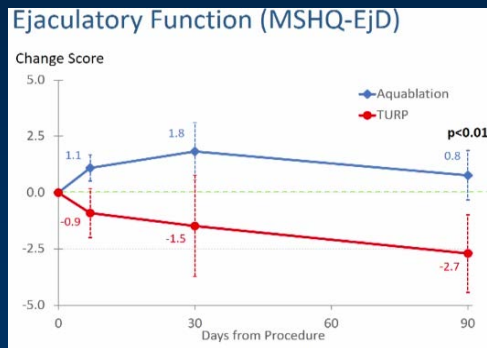
- 21 patients
- Mean volume 57.2ml (30-102)
- Aqua Rx time 5 min (3-15)
- Vol Reduction 34% (35-53 ml)
- No urinary incontinence, erectile / ejaculatory dysfunction



Gilling, Anderson, Tan. J Urol 2017;197:1565
 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