



Alternatives to TURP: Why throw out the baby with the bath water?

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Outline

- AUA guidelines on the surgical management of BPH
- Durability and prostate surgery
- Open Prostatectomy
- Bipolar TURP
- Laser Prostatectomy
 - Photoselective Vaporization of the Prostate (PVP)
 - Holmium Laser Ablation of the Prostate (HoLAP)
 - Holmium Laser Enucleation of the Prostate (HoLEP)
- Laparoscopic Simple Prostatectomy

The Optimal Minimally-Invasive Treatment of BPH

- Significant reduction in symptoms
- Absence of major complications
- Minimal minor complications
- Wide-spread availability
- Durability

PSA and Prostate Volume

- PSA a surrogate for prostate volume
- Documentation of reduction in PSA increasingly reported in trials of surgical therapy
- Is reduction in PSA in the short-term an adequate marker for long-term equivalency of a procedure to TURP/OP?

Eur Urol. 44:695, 2003

Our Gold Standards-TURP and Open Prostatectomy

AUA Guidelines-BPH and TURP

- 15-point reduction in AUA SS
- > 3-point improvement in bother
- 1% incontinence, 10% ED, 65% retro ejac.
- 5% postop retention
- 15% irritative symptoms
- 0.25% mortality
- 4-5% transfusion rate
- 7% BNC/urethral stricture
- 5% repeat TURP

www.aua.org

J. Urol. 141:243, 1989

J Urol. 170:530-547, 2003

J Urol. 164:1212-1215 , 2000

“Why mess with a good thing?”

- “Prostatectomy night in Canada”-Manitoba
 - 15.5-16.8% repeat surgery post-TURP v. 4.5-7% post-OP at 8-yrs
- Austrian series (n=577; avg 37g resection)
 - 6% re-operative rate at 10-years
- Japanese series (n=717)
 - 5.6% repeat TURP at 12-yrs

Varkarakis et al, Prostate 58:248-251, 2004
Koshiba et al, J Urol. 153:1506-1509, 1995
Roos et al, NEJM 320:1120-1124, 1989
Roos and Ramsay, J Urol. 137:1184-1188, 1987

Durability- “Rapid Regrowth” v. Inadequate Initial Treatment

- AUA Guidelines 2003- 5% of TURP pts requiring repeat surgery for re-growth
- Sandhu and Te, *Urology* 2004

One patient (2%) underwent repeated PVP procedures within the first year. He developed acute urinary retention at 9 months postoperatively and during his second PVP was noted to have regrowth of prostatic tissue. Two patients had recurrent

Moral of Story- The operating room is not a barber shop

“I always resect out to the surgical Capsule!”

Shimizu et al, 2005

- TURP in 64 pts (avg TRUS volume 37.4 ± 19.9 cc) with avg resected weight of 9.8g
- Subsequent transurethral enucleation (TUE) for avg 10.2g
- 54.5% residual adenoma post-TURP

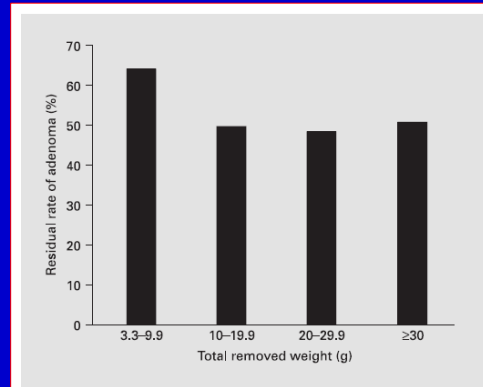


Fig. 11. Relationship between total removed weight and residual rate of adenoma.

Urol Int. 74:102-107, 2005

Open Prostatectomy- The Gold Standard for Durability

- 3% of surgical procedures for BPH in U.S. (v. 12% Sweden and 14% France)
- Helfand and McVary, 2006
 - Single institution; N. America, 10-yr experience; 10 surgeons
 - N=56; Op time 214 minutes (range 120-320)
 - 36% transfusion rate
 - Majority of transfusions required postop!
 - Marked ↓ PSA - 13.34 ± 1.7 ng/dl → 0.73 ± 0.53
 - 1.8% ancillary medication rate; 0% re-operative rate for regrowth

Eur Urol 36(suppl.3):14-20, 1999
Scand J Urol Nephrol 30:37-46, 1996
Eur Urol. suppl.36:7, 1999
J. Urol. 176:2557-2561, 2006

“Big” TURP & OP-Consent is Consent!

Author	Technique	N	Prost Volume (cc)	LOS (d)	Transfusion
Varkarakis et al, 2004	OP	232	105 ± 32	6	6.8%
Baumert et al, 2006	OP	30	106 ± 25	8	16.7%
Meier et al, 1995	OP	240	61 (10-300)	9	4.6%
Serretta et al, 2002	OP	1804	70 (35-260)	7	8.2%
Condie et al, 1999	OP	200	N/A	6.2	4%
Muzzonigro et al, 2004	TURP	56	81 (73-108)	5	8.9%

Z. Perler- “How about some hemo-stasis, my boy!”

Now the Challengers

RCT- TURP v. Bipolar Plasmakinetic® Prostate Vaporization

TABLE 5. Preoperative and postoperative outcomes, complications and followup results

	TURP	PKVP	p Value
No. pts	79	81	
Mean preop ± SD:			
Age	68.1 ± 7.5	66.1 ± 8.5	0.13
Prostate vol (cc)	40.0 ± 17.1	38.0 ± 17.5	0.49
I-PSS score	20.6 ± 7.0	21.3 ± 6.2	0.58
QOL score	4.3 ± 1.3	4.2 ± 1.1	0.84
Max urine flow (ml/sec)	11.9 ± 6.0	12.0 ± 6.4	0.79
Qave (ml/sec)	6.1 ± 2.9	5.9 ± 3.3	0.78
Post-void residual urine (ml)	182 ± 180	147 ± 156	0.26
Mean periop ± SD:			
Resection time (mins)	28.5 ± 15.2	32.6 ± 13.4	0.08
Fluid absorption (ml)	305 ± 343	334 ± 423	0.70
Intraop blood loss (ml)	499 ± 374	480 ± 299	0.83
Serum hemoglobin change (gm/dl)	-1.4 ± 1.3	-0.8 ± 0.9	0.002 (≤0.05)
% Serum hematocrit change	-1.5 ± 2.3	-1.5 ± 5.0	0.97
Serum sodium change (mmol/dl)	-2.2 ± 3.1	-2.0 ± 2.5	0.73
Postop:			
Mean irrigation ± SD (l)	28.3 ± 16.3	20.4 ± 10.9	0.001 (≤0.05)
No. bladder washouts	88	71	0.13
Mean % successful first trial without catheter ± SD	68 ± 90.7	79 ± 93.6	0.50
Mean postop stay ± SD (days)	3.4 ± 1.1	3.0 ± 0.9	0.04 (≤0.05)
No. Ca histology (%)	6 (10.1)	—	—
No. complications:			
Transfusion	4 (5.3%)	0	0.02 (≤0.05)
Rehospitalization for secondary hemorrhage	2	1	—
Rehospitalization for acute urinary retention	2	1	—
Urethral stricture	1	0	—
No. reoperation (bladder neck incision for stenosis)	2	1	—
Mean followup ± SD:			
No. pts	73	76	
Days	265 ± 153	247 ± 131	0.46
I-PSS score	6.9 ± 5.8	7.7 ± 6.8	0.44
QOL score	1.5 ± 1.5	1.7 ± 1.5	0.64
Max urine flow (ml/sec)	23.5 ± 15.2	25.6 ± 15.6	0.41
Qave (ml/sec)	11.9 ± 7.1	15.0 ± 9.4	0.03 (≤0.05)
Post-void residual urine (ml)	69 ± 67	64 ± 65	0.68

J Urol. 176:205-209, 2006

RCT-TURP v. Bipolar Plasmakinetic Resection

TABLE I. Preoperative data

Baseline Parameter	Monopolar (n = 35)	Plasmakinetic (n = 35)
Age (yr)	61 (5.9)	59 (5.9)
Prostate volume (cm ³)	47.5 (5.1)	51.6 (3.9)
PSA (ng/mL)	2.1 (0.9)	2.4 (1.0)
IPSS	24.3 (5)	24.18 (4)
QOL score	3.9 (1)	4.2 (1)
Qmax (mL/s)	6.3 (3)	7.1 (2)
PVR volume (mL)	75 (35.5)	80 (22.5)

KEY: PSA = prostate-specific antigen; IPSS = International Prostate Symptom Score; QOL = quality-of-life; Qmax = maximal urinary flow rate; PVR = postvoid residual.

TABLE II. Mean perioperative data

Parameter	Monopolar	Plasmakinetic
Operative time (min)	53	49
Resection time (min)	39	33
Resected tissue (g)	24	20
Variation in Hb level at 24-hr follow-up (g/dL)	-1.0	-0.8
Variation in serum Na ⁺ at 2-hr follow-up (mg/dL)	-0.9	-0.6

KEY: Hb = hemoglobin.
All P values nonsignificant.

TABLE III. Mean postoperative data

Parameter	Monopolar	Plasmakinetic	P Value
Transfusion (n)	0	1	NS
TUR syndrome (n)	0	0	NS
Mean time to catheter removal (hr)	100	72	<0.05
Mean time to discharge (hr)	107	78.2	<0.05
Time of continuous bladder irrigation (hr)	52	30	<0.05
Clot evacuation (n)	4	2	NS
Bladder neck stricture (n)	1	1	NS

KEY: NS = nonsignificant; TUR = transurethral resection.

Urology 67:69-72, 2006

RCT-TURP v. combined Bipolar Plasmakinetic Vaporization/Resection

TABLE 1. Patient characteristics, and perioperative and postoperative finding

	Mean PlasmaKinetic® ± SD	Mean TURP ± SD	p Value (Mann-Whitney test)
No. pts	49	47	
Mean age	68.7 ± 6.3	69.4 ± 5.9	Not significant
Mean prostate size (gm)	50.1 ± 17.3	54.0 ± 15.2	Not significant
Mean operative time (mins)	40.3 ± 11.4	57.8 ± 13.4	<0.01
Irrigation (l):			
Periop	11.4 ± 4.5	18.3 ± 13.6	<0.05
Postop	6.9 ± 1.5	7.8 ± 1.7	Not significant
Catheterization (days)	2.3 ± 0.7	3.8 ± 0.7	<0.05

TABLE 3. Complications during early postoperative period and long-term followup

	No. PlasmaKinetic® (%)	No. TURP (%)	p Value
No. pts	49	47	
Early bleeding necessitating blood transfusion	1 (2)	1 (2.1)	
Early severe irritative symptoms:	6 (12.2)	2 (4.3)	
Dysuria	6	2	
Urgency	3	1	
Frequency	4	2	
Nocturia	2	1	
Recatheterization need	2	—	
Early acute urinary retention + re-catheterization need	1 (2)	1 (2.1)	
Totals	8 (16.3)	4 (8.5)	0.0014 (Fisher's exact test)
Long-term complications:			
Urethral stricture	3 (6.1)	1 (2.1)	0.002 (Fisher's exact test)
Total incontinence	0	1	
Reoperation need	2 (4.1)	1 (2.1)	
Totals	5 (10.2)	3 (6.3)	Not significant (Fisher's exact test)
Retrograde ejaculation	29 (59.2)	30 (63.8)	Not significant (chi-square test)

No patients had serum electrolyte imbalance or loss of erectile function.

J Urol. 174:1339-1343, 2005

HoLEP v. Bipolar Plasmakinetic Enucleation

RCT-n=40
Gilling and Fraundorfer (HoLEP pioneers)

TABLE I. Preoperative and perioperative parameters

Parameter	HoLEP	PkEP	P Value
Age (years)	68.9 ± 2.0 (52–83)	67.0 ± 1.7 (56–83)	0.812
IPSS	25.8 ± 1.3 (15–35)	24.4 ± 1.2 (17–35)	0.442
Qmax (mL/s)	7.4 ± 0.5 (4–13)	7.5 ± 0.8 (2–14)	0.957
TRUS volume (cm ³)	57.0 ± 5.1 (20–99)	51.0 ± 3.9 (20–82)	0.366
PVR (mL)	125.0 ± 19.3 (13–321)	114.0 ± 23.2 (2–366)	0.718
Schäfer PURR grade	3.4 (2–6)	3.9 (2–6)	0.523
Operative time (min)	43.6 ± 5.3 (14–101)	60.5 ± 6.1 (12–120)	<0.05
Pathologic specimen weight (g)	21.7 ± 3.2 (2–47)	20.0 ± 2.5 (0.2–40)	0.557
Bladder irrigation required	1 (5)	7 (35)	<0.001
Recovery room time (min)	47.1 ± 4.1 (2–90)	65.6 ± 5.9 (36–140)	<0.01
Catheter time (hr)	25.1 ± 7.5 (14–168)	24.8 ± 6.3 (14–144)	0.972
Patients recatheterized	5	4	
Hospitalization time (hr)	32.5 ± 5.0 (20–120)	31.7 ± 5.9 (23–144)	0.923

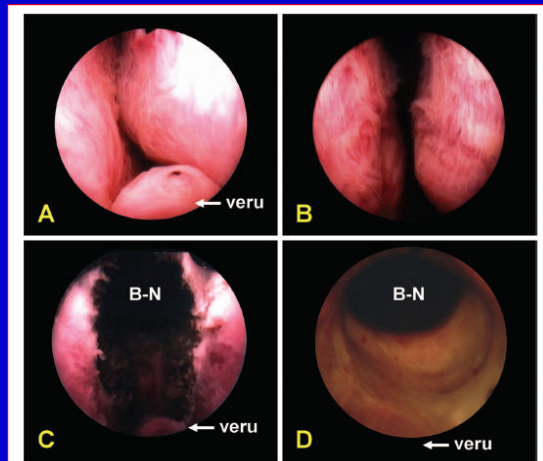
Interpretation- reasonable contender to HoLEP but with the same learning curve of a transurethral enucleation procedure

Urology 68:1024-1028, 2006

Photoselective Vaporization of the Prostate (PVP)

- KTP = Potassium-titanyl-phosphate
- 80W KTP laser (Laserscope → AMS)
- 532 nm wavelength absorbed by oxyhemoglobin
- Deeper tissue penetration than holmium laser
- GA, regional, local/IV sedation
- H₂O or saline irrigant; continuous flow 22F cystoscope (or 27F laser resectoscope)
- Single use 600 μm side-firing fiber (> \$1000)
- fiber 1-2 mm from tissue for vaporization
- Defocus to 3-4 mm for hemostasis (? ↓ to 40W)
- Channel created until “capsule” visualized

Photoselective Vaporization of the Prostate (PVP)



J. Urol. 174:1344-1348, 2005

The rise of Photoselective Vaporization of the Prostate

“Gold Rush”

- Unparalleled marketing
- distribution via mobile units (the lithotripter “cartel”)
- Quick and easy
- “the laser”
- Rapid acceptance and patient accrual in studies by the “BPH Boys”- promising short-term results that can justify increased utilization

“Irrational Exuberance” Alan Greenspan

- Limited follow-up prior to widespread utilization
- Early resumption postoperative patient activity- fuels pt acceptance
- derogation of HoLEP, TURP
- Expansion to large prostates without long-term data- *just because you can doesn't mean you should*
- Negates experience from early trials of Holmium laser ablation of the prostate, VLAP, TUVAP- ? *Did anyone go to the library*

Photoselective Vaporization of the Prostate (PVP)

Author	N	Prost Vol.(cc)	Op time (min)	↓PSS @ 12 mo	↑ Q max @12 mo	Reduction in PSA
Bachman, 2005	108	52.2 ± 24.3	54.5 ± 25	81%	252%	N/A
Malek et al, 2005	94	45 ± 17	47 ± 17	83%	252%	30%
Te et al, 2004	139	54.6 ± 31.7	38.7 ± 23	82%	290%	31%
Hai and Malek, 2003	10	41.4 ± 18.5	N/A	89%	198%	42%
Barber et al, 2004	30	60	N/A	69%	135%	N/A
Sandhu et al, 2004	64	101 ± 40	122.9	63%	239%	44%

Photoselective Vaporization of the Prostate- Concerns

- Expensive *single-purpose* laser with expensive *single-use* fibers
- Channel TURP → ? Late failures
- Reduced vaporization effectiveness through treated tissue
- Orange-tinted glasses- reduced visibility if bleeding encountered
- Significant postoperative irritative symptoms- underreporting by investigators

PVP and the Anticoagulated Patient

- Sandhu et al, 2005
 - n=24 preop anticoagulation
 - n=8 warfarin; stop 2d prior and resume day after
 - n=2 Clopidogrel (Plavix); not discontinued
 - n=14 Aspirin; not discontinued
 - No adverse thromboembolic events
 - No transfusions; no delayed bleeds

J Endourol. 19(10):1196-1198, 2005

Interpretation- *Plavix and Prostate Surgery*-Better to be lucky than good!

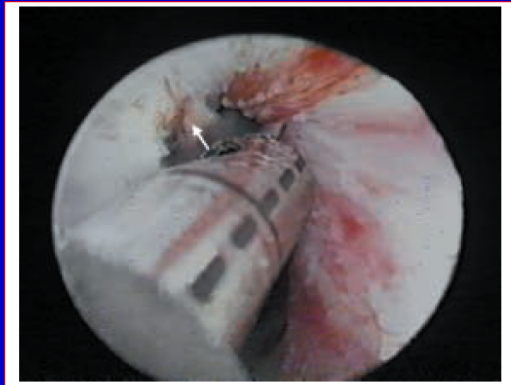
Photoselective Vaporization of the Prostate- Concerns

- Lack of tissue for analysis- more vigilant follow-up of younger patient
- Size “creep”- *optimistic indications*
- *What do you say about a prostate operation with a low rate (<25%) of retrograde ejaculation?*
- Malek, 2005- *KTP results in an “unscarred, elastic bladder neck and an open and pliable prostatic channel”- ???- HEAT IS HEAT!*

Holmium Laser Ablation of the Prostate

- 70° side-firing 550 μm duotome fiber (Luminis)
- Water or saline irrigant
- > 25F continuous flow resectoscope
- 2 J/50 Hz; 2.4 J/40 Hz
- Rotation of fiber circumferentially until “capsule” reached; fiber tip in direct contact with tissue
- Ablation of ~ 1 gram per minute (JE Wright “*I’m from Missouri, show me!*”)
- Long-term data available- 15% reoperation rate-
Gilling. J Endourol. 2002

Holmium Laser Ablation of the Prostate



My Interpretation- Results no different than KTP

LD Sullivan's Interpretation- “a long haul for a short slide”

Holmium Laser Enucleation of the Prostate- Advantages

- MIS version of open prostatectomy-*Tried and true*
- “no size limitations” – *Kuntz, 2004*
- Saline irrigant- no TUR syndrome
- Decreased intraop bleeding; ↓ transfusions
- Minimal need for postop bladder irrigation
- Tissue for pathology- 5-10% incidence CaP
- Early catheter removal-POD#1
- Immediate improvement in symptoms and flow rate
- Reduced postop bleeds *Elzayat and Elhilali, 2005, 2006*
- Short convalescence
- ? ↓ BNC, urethral strictures *Elzayat and Elhilali, 2005*

HoLEP series

Author	N	TRUS Volume(cc)	Enucl. time (min)	Morc. Time (min)	↓ PSS @ 12 mo.	↑ Q max @12 mo	↓PSA
Elhilali, 2005	552	83.7 ± 49.7	86 ± 40.6	16.7 ± 15.6	75%	200%	84%
Matlaga, 2006	86	170.2 (125-309)	128.1		74%	274%	90%
Kuntz et al, 2004	100	53.5 ± 20.0	94.6 ± 35.1		92%	469%	N/A
Rigatti et al, 2006	52	60.3 ± 36.7	74 ± 19.5		81%	306%	N/A
Naspro et al, 2006	41	113 ± 35	72 ± 21		58%	285%	N/A
Vavassori et al, 2004	196	54.3 ± 30.8	83.2 ± 42.5		92%	148%	N/A
Tan et al, 2003	30	77.8 ± 5.6	35.8 ± 2.9	11.6 ± 2.7	83%	260%	N/A

HoLEP- Learning Curve

- Lord Nelson- “takes numbers to annihilate”
- Comfort with large TURP-? postgraduate procedure
- Long learning curve (? 40-60 cases prior to taking on large prostates)
- Anatomy- tissue planes best in larger prostates
- Advantage of operation with large prostates
- “Lost in the wilderness”- what to do when prostate too big for backup plan of TURP?

HoLEP and Anticoagulation

TABLE 5. TURP and HoLEP in patients on anticoagulation

	Parr et al ¹³	Chakravarti and MacDermott ¹⁴	Dotan et al ¹⁵	Present Series
No. pts	12	11	20	83
No. anticoagulation:				
Full	12			14
Full heparinization		11		
LMWH			20	34
Stopped temporarily				33
Mean cc-preop prostate vol (range)	Not stated	23.2 (4–60)	Not stated	82.4 (25–222)
Mean gm resected tissue wt (range)	22 (6–41)	Not stated	26 (8–56)	54.7 (6–245)
No. postop bleeding	1	3	2	3
No. transfusion (%):	4 (33)	1 (9.1)	4 (20)	8 (9.6)
Full anticoagulation				2 (14.2)
LMWH				5 (14.7)
Stopped temporarily				1 (3)

Elzayat et al, J. Urol. 175:1428-1432, 2006

HoLEP and Anticoagulation-Lessons Learned

- “HoLEP and the fully anticoagulated pt”
 - MG McLoughlin’s famous bicycle ride to Whistler –” Not going to do that again”
 - Talk to your internist/cardiologist/hematologist
 - *Surgeon makes the final decision on anticoagulation*
 - Temporary cessation of anticoagulation with bridging preop with LMW Heparin (last dose AM prior to surgery) if high risk of thromboembolic event
 - avoid LMW Heparin postop!
 - Restart warfarin night of surgery (or POD#1)
 - Unfractionated heparin 6 hours postop (no bolus) if high risk thromboembolic event

HoLEP-Lessons Learned

- Transient SUI rate higher than TURP (similar to open prostatectomy)- must counsel patient pre- and postop
- ? “no size limitation” – tunnel vision by investigators -not enough big glands (> 250g) in their series to make this conclusion
- An “anaesthetic is an anaesthetic”- prolonged procedure times in high-risk patients

Holmium Laser Enucleation of the Prostate-Future Role

- Investigator durability-same cast of characters
- Amenable to daycare surgery (~80%)
- Referral centers as alternative to open prostatectomy
- Rapid acceptance in Europe and Asia (*like Jerry Lewis*); slow acceptance in N. America
- Anticoagulated patients-early resumption
- Large prostates (60-250 grams on TRUS)
- Concomitant bladder calculi

Lap. v. Open Simple Prostatectomy

TABLE 1. Preoperative and perioperative parameters in laparoscopic and open groups

	Mean Laparoscopic \pm SD	Mean Open \pm SD	p Value
Age	67.4 \pm 6.0	69.7 \pm 7.4	0.21
BMI	26.8 \pm 2.5	26.8 \pm 3.0	0.92
Preop prostate size (ml)	121.8 \pm 39	106.2 \pm 25	0.07
Operative time (mins)	115 \pm 30	54 \pm 19	<0.01
Blood loss (ml)	367 \pm 363	643 \pm 647	0.045
Specimen wt (gm)	77.2 \pm 32.4	78.1 \pm 42.2	0.93
Irrigation time (days)	0.33 \pm 0.7	4 \pm 3.5	0.003
Catheterization time (days)	4 \pm 1.7	6.8 \pm 4.7	0.004
Hospital stay (days)	5.1 \pm 1.8	8.0 \pm 4.8	0.003

Transfusion was given in 1 of 30 patients (3.33%) in the laparoscopic group and in 5 of 30 (16.7%) in the open group (p = 0.19).

J. Urol. 175:1691-1694, 2006

Laparoscopic Simple Prostatectomy

Author	N	Prostate Volume (cc)	OR time (min.)	LOS (d)	Transfusion
Baumert et al, 2006	30	122 ± 39	115 ± 30	5.1 ± 1.8	3.3%
Sotelo et al, 2005	17	93	156 (85-380)	2 ± 1.1	29%
Van Velthoven et al, 2004	18	95.1 ± 28	145 ± 32	5.9	0%

Laparoscopic Simple Prostatectomy- Concerns

- Increased operative time c/t open prostatectomy without substantial ↓LOS
- Similar complication rate to OP; reduced transfusion rate at centers of excellence
- Lap prostate series- mute/negative re: HoLEP (*the evidence is the evidence!*)
- Referral alternative (HoLEP) available in most provinces (or will be!)
- Open operation rarely performed in 2007
- ? Reserved for centers without 80-100W Holmium laser; advanced laparoscopic skill set

Conclusion

- TURP and open prostatectomy durable
- Complication rates for TURP in community likely much lower than AUA guidelines
- Alternatives to TURP/OP may not fit case mix for most urologists
- Reduction in PSA post-procedure a surrogate for reduction in prostate volume
- Maintain healthy skepticism for challengers