

HE WHO ASKS A QUESTION
IS A FOOL FOR FIVE
MINUTES; HE WHO DOES
NOT ASK A QUESTION
REMAINS A FOOL FOREVER.

- CHINESE PROVERB -

EVEN IF YOU'RE ON THE
RIGHT TRACK, YOU'LL
GET RUN OVER IF YOU
JUST SIT THERE.

- WILL ROGERS -

COURAGE IS RESISTANCE TO FEAR,
MASTERY OF FEAR, NOT ABSENCE OF
FEAR.

- MARK TWAIN -

BPH REVIEW: OLD AND NEW

(BENIGN PROSTATIC HYPERPLASIA)

Scott Barkin, DO, FACOS



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BPH

- Prostate definition (from the Greek); 'to stand before/alone'
- 8% in 4th decade → 90% in 9th decade
- Refers to size and histology, not symptoms
- Lower Urinary Tract Symptoms (**LUTS**)
 - Irritation, obstruction or a mix
 - 5,000 men 65+; 45% report moderate to severe LUTS
 - 30,000 men (USA, UK, Sweden): 75% sometimes LUTS / 45% often LUTS
- Bladder Outlet Obstruction (**BOO**)
 - Most commonly from BPH (neurologic #2 most common cause)
 - Can lead to bladder wall changes which can lead to upper tract changes
- Average size → 25 gm (cc)

Table 1. Differential Diagnosis of LUTS (Lower Urinary Tract) Symptoms

Benign prostatic hyperplasia

Bladder calculi

Bladder cancer

Bladder irritants (e.g., caffeine)

Diabetes mellitus

Medication use

Anticholinergics (incomplete emptying)

Antidepressants, such as tricyclics

(frequency, incomplete emptying)

Antihistamines (incomplete emptying)

Bronchodilators (straining)

Diuretics (frequency)

Opioid analgesics (incomplete emptying)

Sympathomimetics (straining,

(incomplete emptying)

Neurogenic bladder

Obstructive sleep apnea

(nocturia)

Overactive bladder

Polyuria (isolated nocturnal,
24-hour polyuria)

Prostate cancer

Prostatitis

Urethral or bladder neck
strictures

Urethritis/sexually

transmitted infections

Urinary tract infections

BPH

- Pathophysiology

- Not well understood
- Size \neq symptoms
- Alpha Adrenergic Receptors at prostatic urethra-bladder neck
 - ✓ Stimulation of sympathetic nerve fibers above = contraction of smooth muscle; urinary obstruction
 - ✓ That's why alpha blockers work

- Risk Factors

- Mild correlation: age, African American, obesity, DM, ETOH

BPH Evaluation

- Primary Care
 - International Prostate Symptom Score (IPSS) sheet
 - Review EtoH diet, caffeine, any other risk factors
 - RX (see Table 1)
 - ✓ Obstructive
 - Anticholinergics, Antihistamines, Opioids
 - ✓ Irritative
 - Diuretics
 - B Blocker, Beta Blockers, Calcium Channel Blockers
- DRE
 - Not just nodules but sphincter tone
- UA
- PSA if 10-year life expectancy
- No imaging needed unless sign/symptoms of upper GU tract issues (flank pain, hematuria)

International Prostate Symptom Score (IPSS)

Over the past month	Not at all	Less than one time in five	Less than half the time	About half the time	More than half the time	Almost always
Incomplete emptying*	0	1	2	3	4	5
Frequency	0	1	2	3	4	5
Intermittency	0	1	2	3	4	5
Urgency	0	1	2	3	4	5
Weak Stream	0	1	2	3	4	5
Straining	0	1	2	3	4	5
Sleeping	0	1	2	3	4	5
Add Symptom Scores:						

	Delighted	Pleased	Mostly Satisfied	Mixed	Mostly Dissatisfied	Unhappy	Terrible
If you were to spend the rest of your life with your urinary condition just the way it is now, how would you feel about that?	0	1	2	3	4	5	6

* In the true sheet the symptoms terms are described

Total International Prostate Symptom score = _____
 1 – 7 mild symptoms | 8 – 19 moderate symptoms | 20 – 35 severe symptoms
 Regardless of the score, if you r symptoms are bothersome you should notify your doctor.

Overview BPH Treatment Options

- Observation
- Dietary Modifications
- Medication
 - Alpha Blockers
 - 5-ARI (Finasteride, Dutasteride)
 - PDE (daily Cialis)
 - OAB RX in combination with above
- Minimally Invasive Surgical Therapy (MIST)
 - TUMT > Historical
 - TUNA >
 - Rezum (Steam Vapor)
 - UroLift
 - iTIND (Temporary Inserted Nitinol Device)
- Other
 - Prostatic Artery Embolization (PAE)
- Definitive Surgery
 - TURP
 - TUIP
 - HoLAP
 - PVP (Green Light)
 - HoLEP/ThuLEP
 - Open Simple or Robotic Prostatectomy
 - Aquablation

BPH Treatment MILD-MODERATE Symptoms

- Conservative management is the preferred approach for patients with mild symptoms and without complicating factors.
- Watchful waiting is based on patient education, lifestyle interventions and disease monitoring.
- Lifestyle modifications for mild symptoms
 - Beverage's without alcohol, caffeine, carbonation, acidic.
 - ✓ Convert all beverages to water
 - Highly seasoned foods.
 - Decreasing evening fluid intake / time voiding schedule / limit salt / losing weight
 - Limiting medications known to cause lower urinary tract symptoms (see Table 1 on page 4)
 - ✓ Anticholinergics, Antihistamines, Antidepressants, Diuretics, Bronchodilators (straining), Opioids
- Patients should be followed up regularly (q 6 mos.) detect worsening of symptoms, or the occurrence of complications.

BPH Treatment

Medications

- Consider if prostate symptom score over 8, despite lifestyle changes
- Alpha adrenergic (Alpha Blockers)
 - Less constrictions of muscle of bladder neck
 - Originally from HPTN RX (now rarely used due to ↑ incidence CVA & CAD)
 - Now selective RX
 - ✓ Flomax (Tamsulosin)
 - ✓ Rapaflo (Silodosin)
 - ✓ Uroxatral (Alfuzosin)
 - IPSS Score ↓ 4-6 points
- Side Effects
 - Hypotension/dizziness
 - ✓ Don't use with PPD – 5 inhibitors (Viagra, etc.): hypotension
 - Cataract surgery may have “Floppy Iris” so stop at least 2 weeks prior
 - But Cialis 5mg does not cause hypotension unless other underlying factors.
 - ED, retrograde ejaculation, decrease libido

See Table 2

BPH Treatment

Medications

- 5 α Reductase Inhibitors (ARI)
 - Testosterone and DHT in prostate are blocked, yet hormonal effects still work
 - Finasteride (ProScar) / Dutasteride (Avodart)
 - IPSS score ↓ 4-6 points
 - Unclear how much size decreases, all agree no increase in size
 - Side Effects
 - ✓ Breast swelling / tenderness
 - ✓ **50% ↓ PSA seen after 6m use; so double the PSA value**
 - Does not change prostate cancer risk
- Combo of 5 Alpha Reductase Inhibitors + Alpha Blockers
 - Work better than separately
 - IPSS score ↓ 6-7 points; not as good many surgeries
- Supplements do not work / ? Side effects
 - Saw Palmetto

See Table 2

Table 2. Medical Therapies for Benign Prostatic Hyperplasia

Medication	Daily Dosage	Cost*	Adverse effects	Comments
Nonselective alpha blockers				
Doxazosin (Cardura)	1 mg; titrate to maximum of 8 mg daily	\$20 (\$80)	Orthostatic Hypotension	Requires blood pressure monitoring and dose titration; less expensive
Terazosin	1 mg; titrate to maximum of 20 mg daily	\$10 (NA)	Orthostatic Hypotension	
Selective Alpha Blockers				
Alfuzosin (Uroxatral)	10 mg	\$20 (\$400)		Low risk of retrograde ejaculation, hypotension; no blood pressure monitoring or dose titration
Silodosin (Rapaflo)	8 mg	NA (\$170)	Retrograde ejaculation	
Tamsulosin (Flomax)	0.4mg; titrate to maximum of 0.8 mg daily	\$30 (\$190)	Decreased ejaculation; highest risk of intraoperative floppy iris syndrome	

Table 2. Medical Therapies for Benign Prostatic Hyperplasia

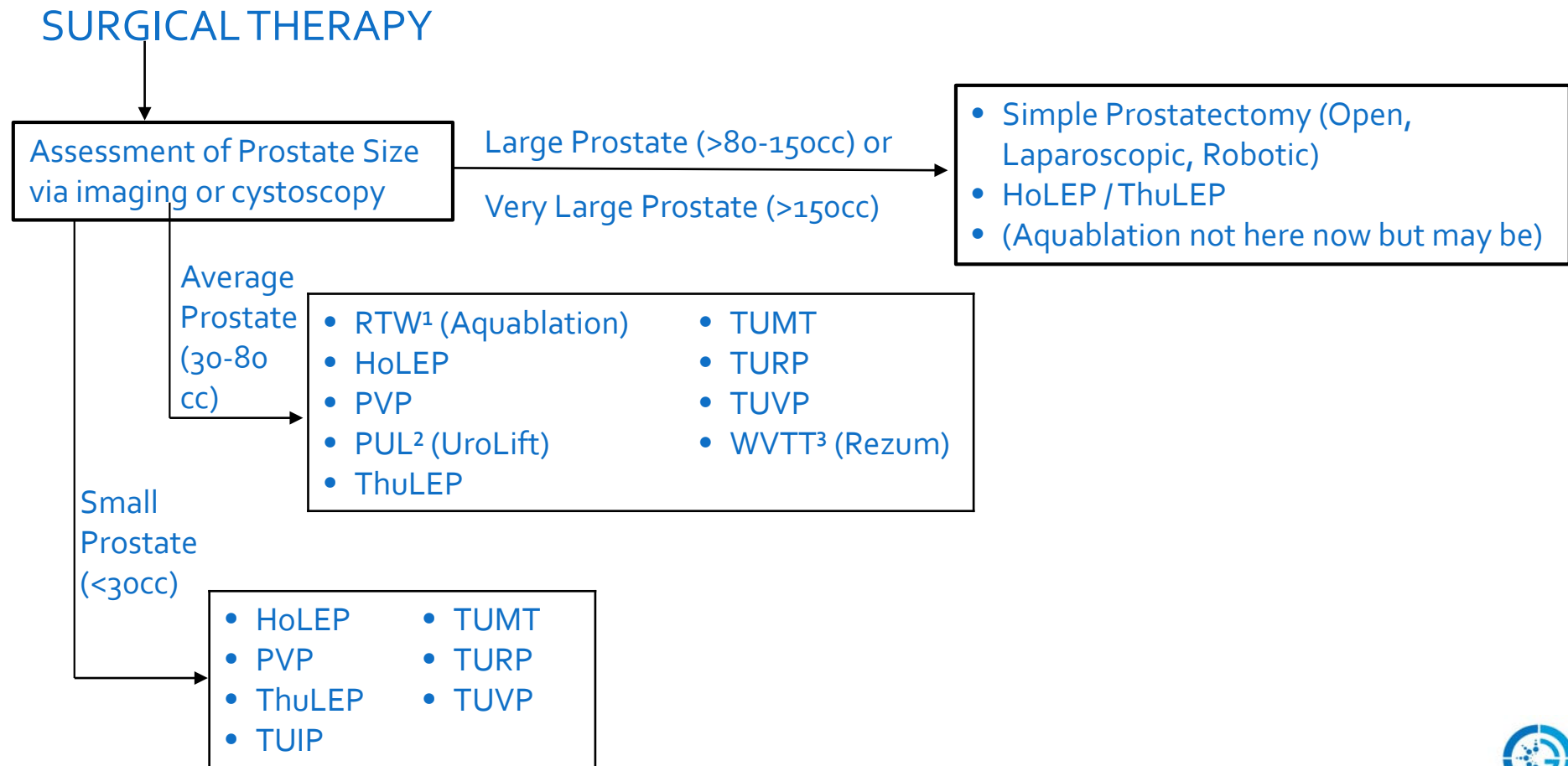
Medication	Daily Dosage	Cost*	Adverse effects	Comments
5-alpha reductase inhibitors				
Dutasteride (Avodart)	0.5 mg	NA (\$155)	Ejaculation disorder, decreased libido, erectile dysfunction	No dose titration; three to six months to take effect; decreases prostate-specific antigen by 50%; combination therapy with an alpha blocker recommended in patients with an enlarged prostate
Finasteride	5mg		Ejaculation disorder, decreased libido, erectile dysfunction	No dose titration; three to six months to take effect; decreases prostate-specific antigen by 50%; combination therapy with an alpha blocker recommended in patients with an enlarged prostate
Anticholinergic agents				
Fesoterodine (Toviaz)	4 to 8 mg	NA (\$210)	Dry mouth and eyes, constipation	Assess postvoid residual urine before starting, for patients with predominantly irritative symptoms
Oxybutynin extended release (Ditropan XL)	10 mg	\$40 (\$175)	Dry mouth and eyes, constipation	Assess postvoid residual urine before starting, for patients with predominantly irritative symptoms
Solifenacin (Vesicare)	5 mg	NA (\$240)	Dry mouth and eyes, constipation	Assess postvoid residual urine before starting, for patients with predominantly irritative symptoms
Tolterodine extended release (Detrol LA)	4 mg	\$150 (\$265)	Dry mouth and eyes, constipation	Assess postvoid residual urine before starting, for patients with predominantly irritative symptoms
Beta 3 Agonist				
Myrbetriq (3 Beta)	25mg-50mg	Depends on insurance up to \$400/mo	Minimal	Assess postvoid residual urine before starting, for patients with predominantly irritative symptoms

BPH Surgical Therapy

- Treatment; guideline recommendations (2021)
 - Failure / Patient Refusal of medical therapy
 - Refractory urinary retention
 - Recurrent urinary tract infection
 - Persistent hematuria
 - Bladder stones
 - Renal insufficiency
- Guidelines of prostate size for surgery purposes (average size 25gm)
 - ✓ Small <30gm
 - ✓ Average 30-80 gm
 - ✓ Large 80-150 gm
 - ✓ Very Large >150 gm
 - ✓ 1700 patients reviewed – 20% over >75gm; 9% over 100gm

Data from Update on AUA guideline on the management of benign prostatic hyperplasia. J Urol 2021

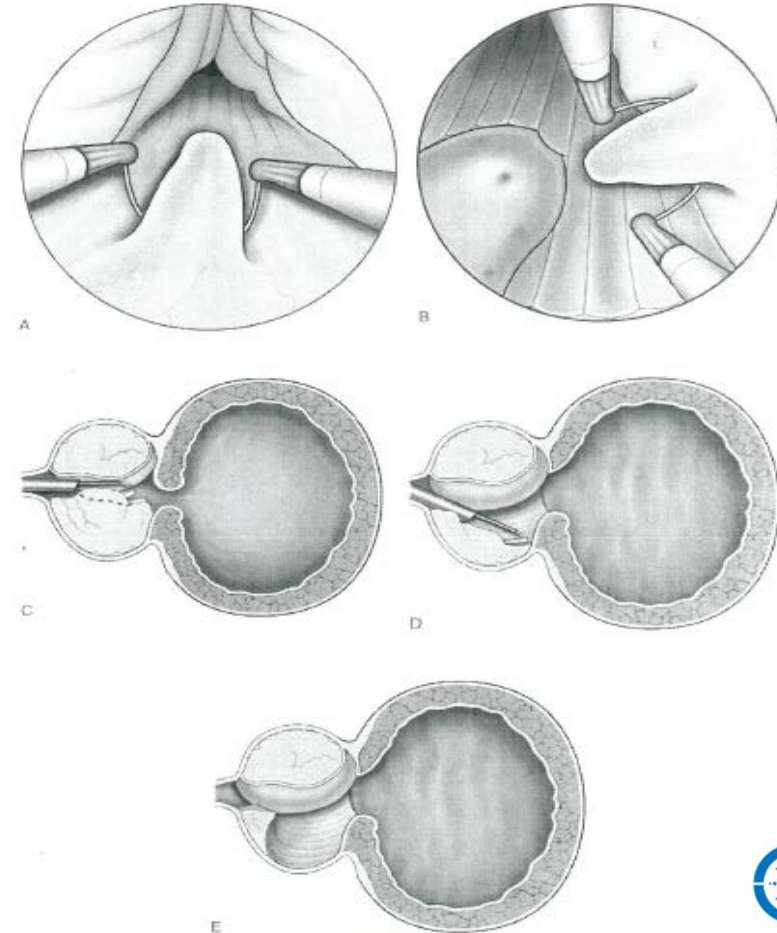
Table 3 Surgical Management of Lower Urinary Tract Symptoms Attributed to Benign Prostatic Hyperplasia



BPH Surgical Treatment (OLD)

The Transurethral Resection of the Prostate (TURP)

- A resectoscope loop introduced into the bladder surgically removes prostate tissue
- Gold Standard; started in 1920's so hundreds of studies done
- Surgery with the most proven long-term outcomes.
- Negatives
 - Dilutional hyponatremia is possible at time of surgery
 - 70% Retro-ejaculation
 - 5-7% Retention
 - Incontinence 0% - 5%
 - Stricture 4%
 - BNC 2%
 - ED 1% - 10%
 - Inpatient Procedure
 - Higher cost
 - Longer hospital stay (2-3 days)

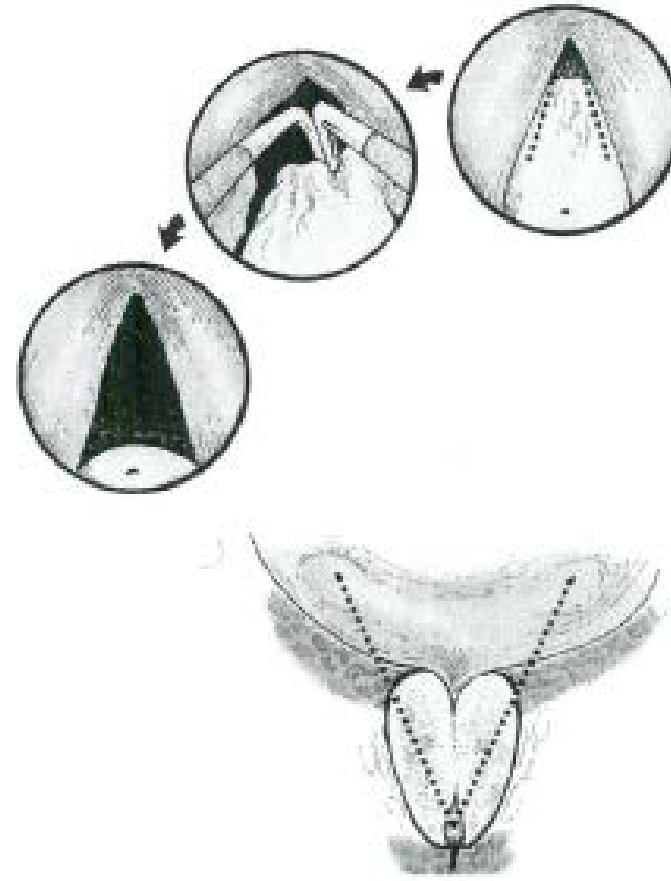


Surgical BPH Treatment (Old)

TUIP

(Transurethral Incision Prostate)

- Small cuts are made in the prostate at 5 and 7 o'clock to reduce urethral constriction
- Pros:
 - **Better for small (<30-g) prostates**
 - Outpatient procedure
 - Less blood loss and shorter hospital stay than with TURP
 - Reduced ejaculatory problems
 - "High-riding" bladder neck
 - IPSS scores high with smaller prostates
 - Complication rate < TURP
- Cons:
 - Higher rate of repeat procedures compared with TURP
 - Lack of large, high-quality studies w/long-term outcomes



Surgery BPH Treatment (Old)

VaporTrode Electrode Current Vaporization

- Device using many configurations of rollerball
- Works on contact using rollerball



+

- Low Bleeding Rate
- Outpatient
- Cath

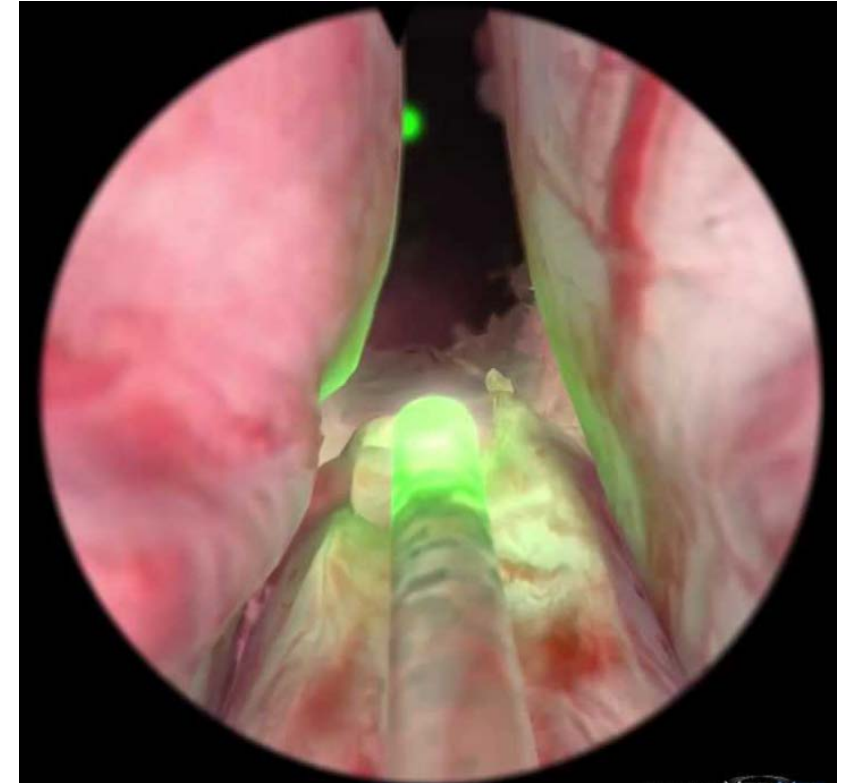
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- <80 gm
- Retrograde ejaculation
- Dysuria
- Few long term studies

BPH Treatment (Old)

Green Light Laser

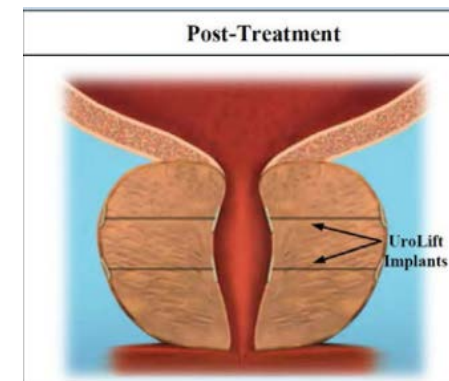
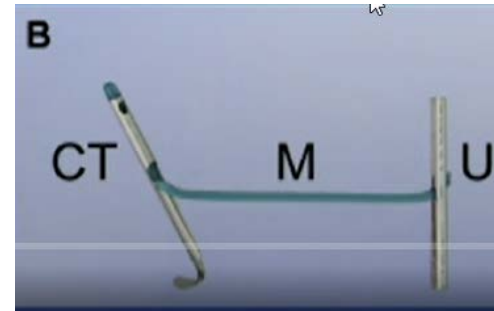
- Holmium YAG Laser vaporizes prostate tissue (non-contact)
- Pros:
 - Continually upgrade of fiber
 - OP procedure
 - Shorter catheterization
 - Less bleeding*
- Cons:
 - Slower and less prostatic tissue removed than with TURP
 - Bladder Neck Scar
 - Irritative Symptoms for up to 12 weeks



New BPH Surgical Treatment

Prostatic Urethral Lift (UroLift)

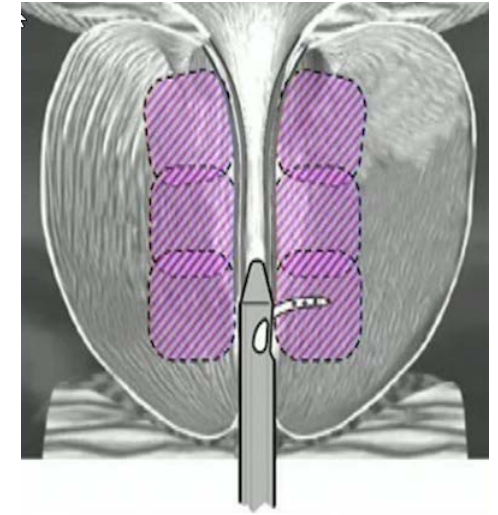
- UroLift®
 - Permanent implants that retract lateral lobe obstructive tissue
 - Lifts the obstruction out of the way
 - ✓ Creates a “new” anterior channel
 - Components:
 - ✓ Nitinol capsular tab
 - ✓ Stainless steel urethral tab
 - Positive
 - ✓ MR compatible
 - ✓ No ED / Retrograde Ejaculation
 - ✓ Outpatient; oral or IV sedation
 - ✓ IPSS + 8 at 5 years
 - Negatives
 - ✓ Cath 50%, 1-2 days
 - ✓ Not really office, more like ASC
 - ✓ Retreatment in 14% at 5 years
 - ✓ Can't use on median lobes + / -



New BPH Surgical Treatment

Water Vapor Thermal Therapy (Rezüm)

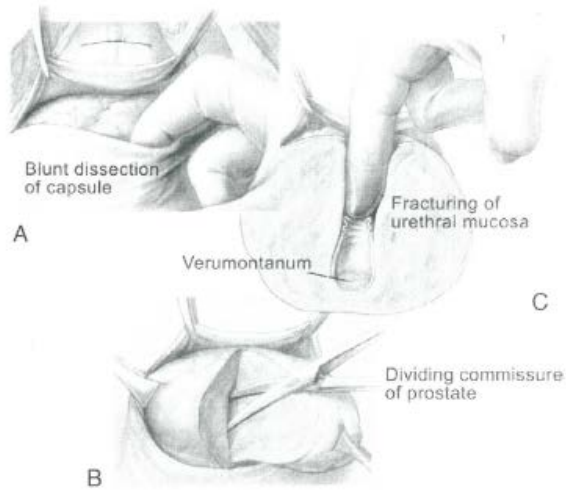
- FDA approved 2015: average size prostate (30-80gm)
- Radiofrequency thermal therapy in the form of steam
 - Caused cell (tissue necrosis death and delayed tissue sloughing)
 - Single use device with a needle and 12 emitters creates at 1.5-2.0 cm lesion
- Positives
 - Office based procedure
 - Use on median lobe
 - Comparable with UroLift long term studies (up to 5 years).
- Negatives
 - High retreatment rate
 - Not as good as TURP especially retreatment and IPSS
 - Lots of irritative symptoms for the first 2 weeks



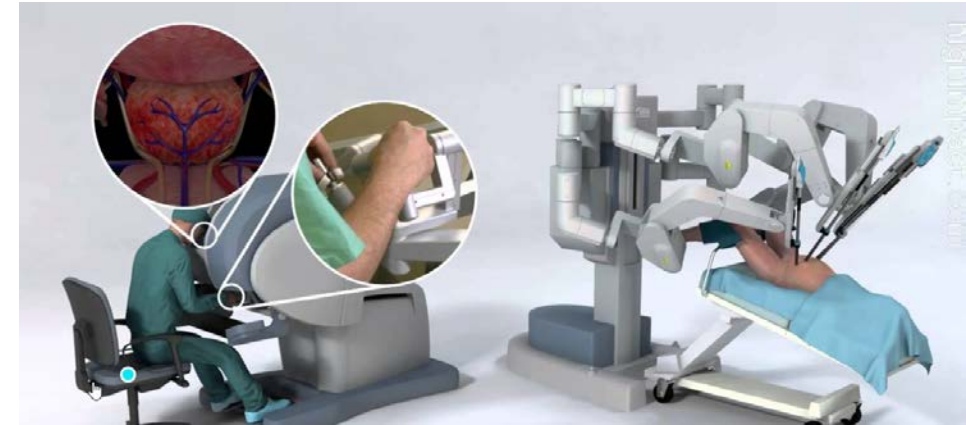
Surgical BPH Treatment Both Old & New

Old Retropubic Simple Prostatectomy

New Robotic Simple Prostatectomy



- Larger glands >250gm
- Ret Ejaculation 90%
- ED: 3-5%
- BNC 5%
- Catheter 3-7 days



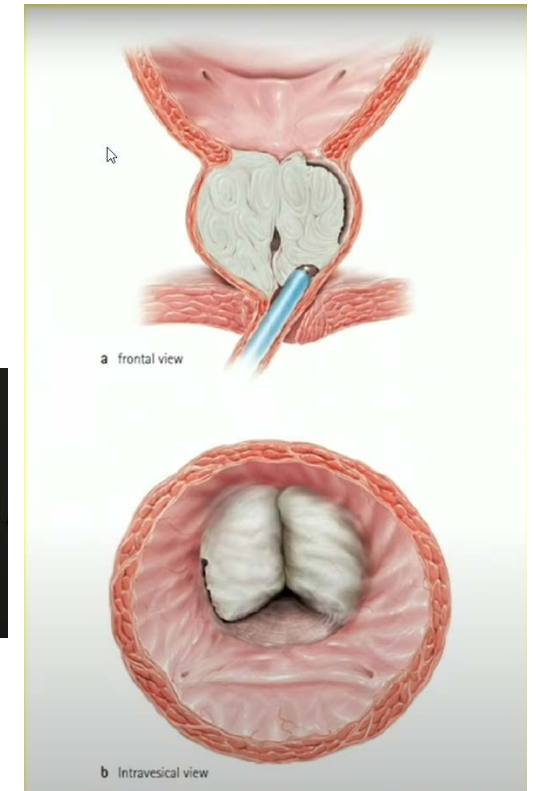
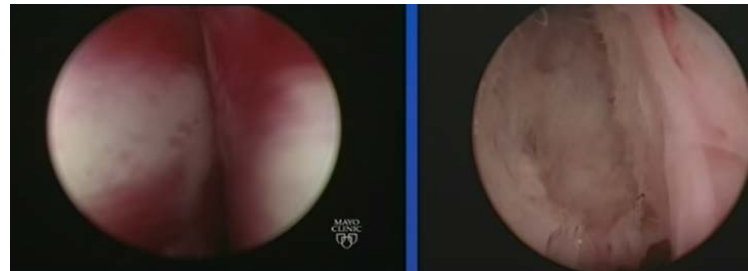
- Larger glands >100gm; doing for all size but usually above 200
- Longer Operation Time
- Complications similar to open but few large studies
- High Cost
- Length of Stay – shorter than open
- Catheter 3-7 days

Surgical BPH Treatment Both Old & New

Holmium Laser Enucleation of the Prostate (HoLEP)

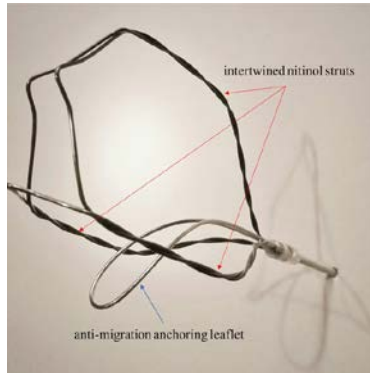
- HoLEP

- First described 1995 but new Holmium laser fiber are more efficient
- All prostate sizes, configurations
- Adenoma separated from prostate capsule
- Enucleated tissue morcellated in the bladder
- - 1000 Patient Study 2018
 - ✓ Size range 9-391 gm
 - ✓ Pre IPSS 20 / at 5 year ↓ to 5
 - ✓ Pre-flow 8 / at 3 years ↑ to 22 (cc/sec)
 - ✓ Long term incont 1-2%
 - ✓ Urethral stricture 2-7%
- Pro
 - ✓ Any size prostate
 - ✓ No incision
 - ✓ Get tissue for pathology
- Con
 - ✓ Long time to do / learn
 - ✓ Morcellation piece of the surgery still an issue (time / side effects)



Very New BPH Treatment

iTIND Device (Temporarily Implanted Nitinol Device)



- Works similar to TUIP: incisions at 5/7 o'clock
- Second-generation iTIND device with three struts and one anchoring leaflet.
- FDA Approved 2020
- 3 Struts at 12, 5, 7 o'clock that stay in 3-7 days
 - Has string during time in
- Good – local, no Cath, ED preserved, device removed in office
- Bad – 5 to 7 day implant with string coming out of penis, no high neck; minimal data

Prostate Embolization

- Interventional Radiology
- Outpatient (maybe)
- Short Cath Time
- Not recommended per AUA (little long-term data)
 - Interventional Radiology Community Disagrees
 - More randomized trials than Rezum, UroLift or Aquablation and has equivalent efficiency / side effects
 - "Jury Still Out"

Very New BPH Surgical Treatment

Aquablation (AquaBeam) System

- Ultrasound Guided
- Robot assisted water jet
- 2015 First Trial
- 2017 FDA approved
- 2020 Medicare approve
BUT still has “t” code for
(experimental) CPT
- 3 main components: see
circles

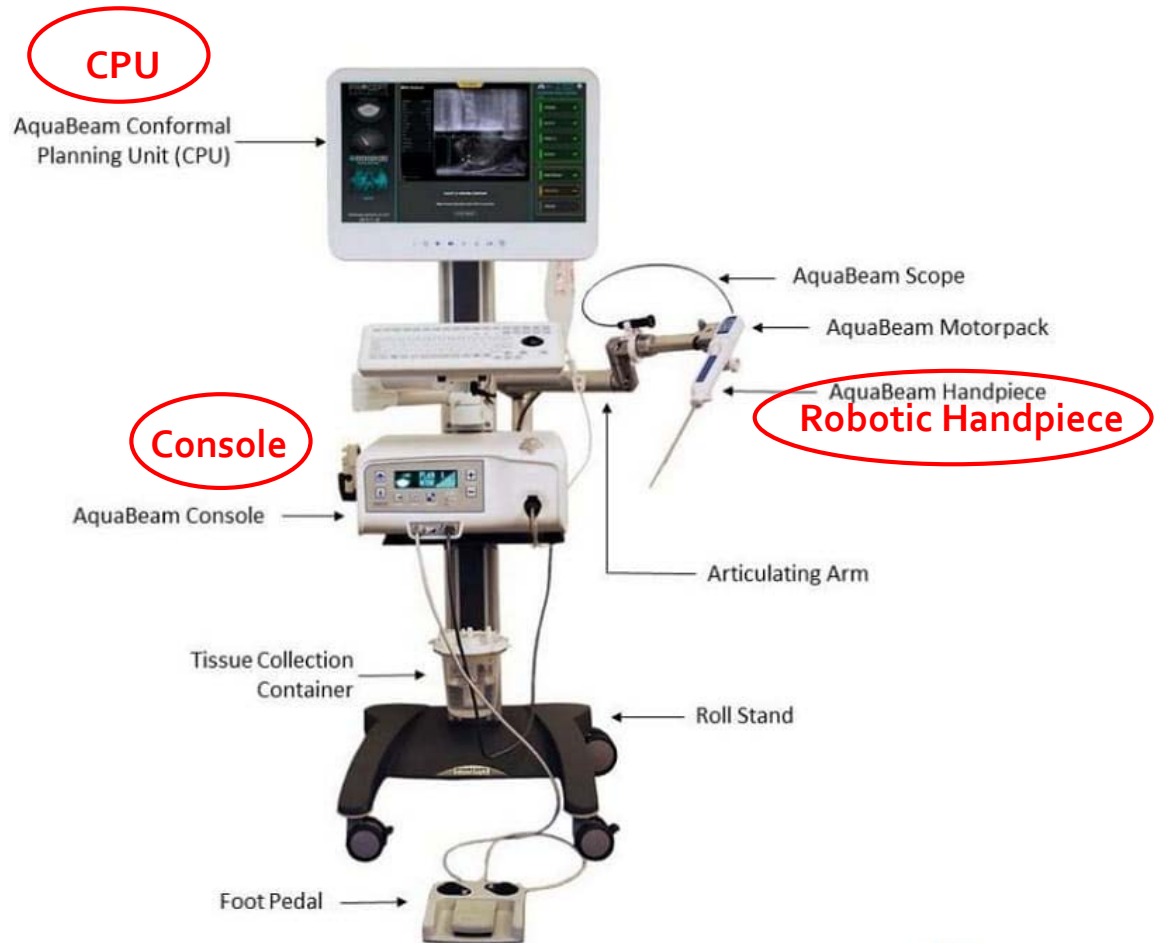


Figure 1 AQUABEAM System



TRUS Insertion

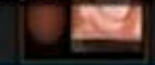
AQUABLATION[®]

Therapy by PROCEPT BioRobotics

TRUS Setup & Insertion



Handpiece Insertion



Mount to Arm



Retract Scope




NEXT

SAGITTAL

09:11:30

SETUP



A medical professional in blue scrubs and white gloves is using an AquaBeam Motorpack and Handpiece. The Motorpack is a white device with a blue display and a blue handle. The Handpiece is a long, thin, white tube with a blue handle. The Handpiece is connected to a long, clear irrigation tubing. The tubing is connected to a blue container. The background is a blue surgical drape.

AquaBeam Motorpack

Handle to Move Water Jet

Irrigation Tubing

AQUABLATION HANDPIECE

END OF HANDPIECE

Red Arrow is end of cystoscopy
White arrow is the nozzle of water





Jet of water from nozzle

Insertion of Handpiece

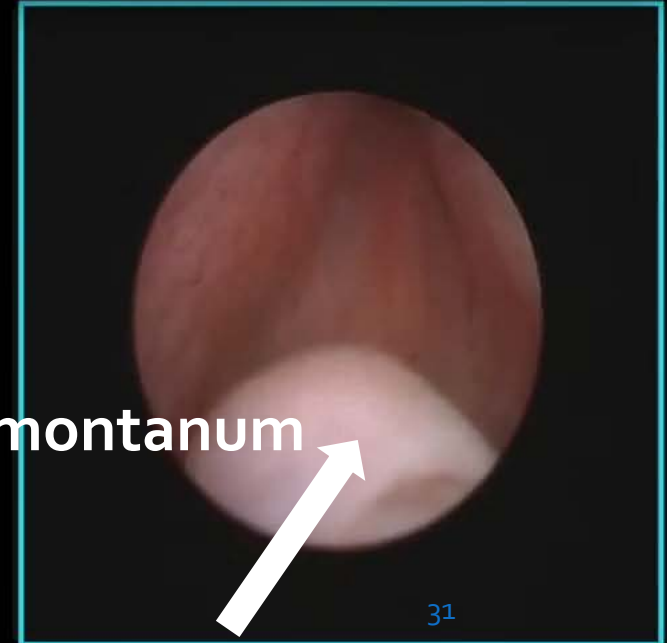


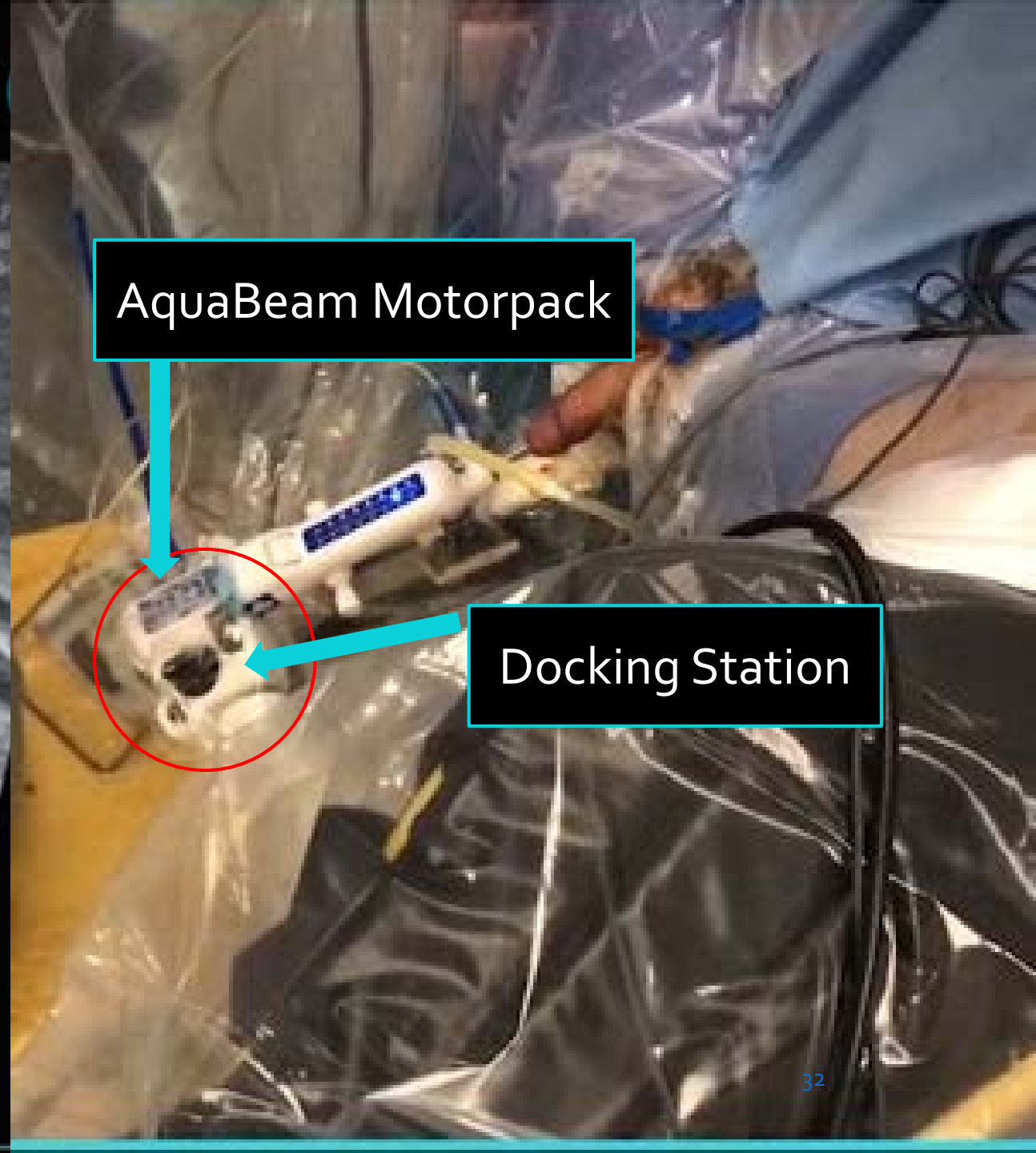
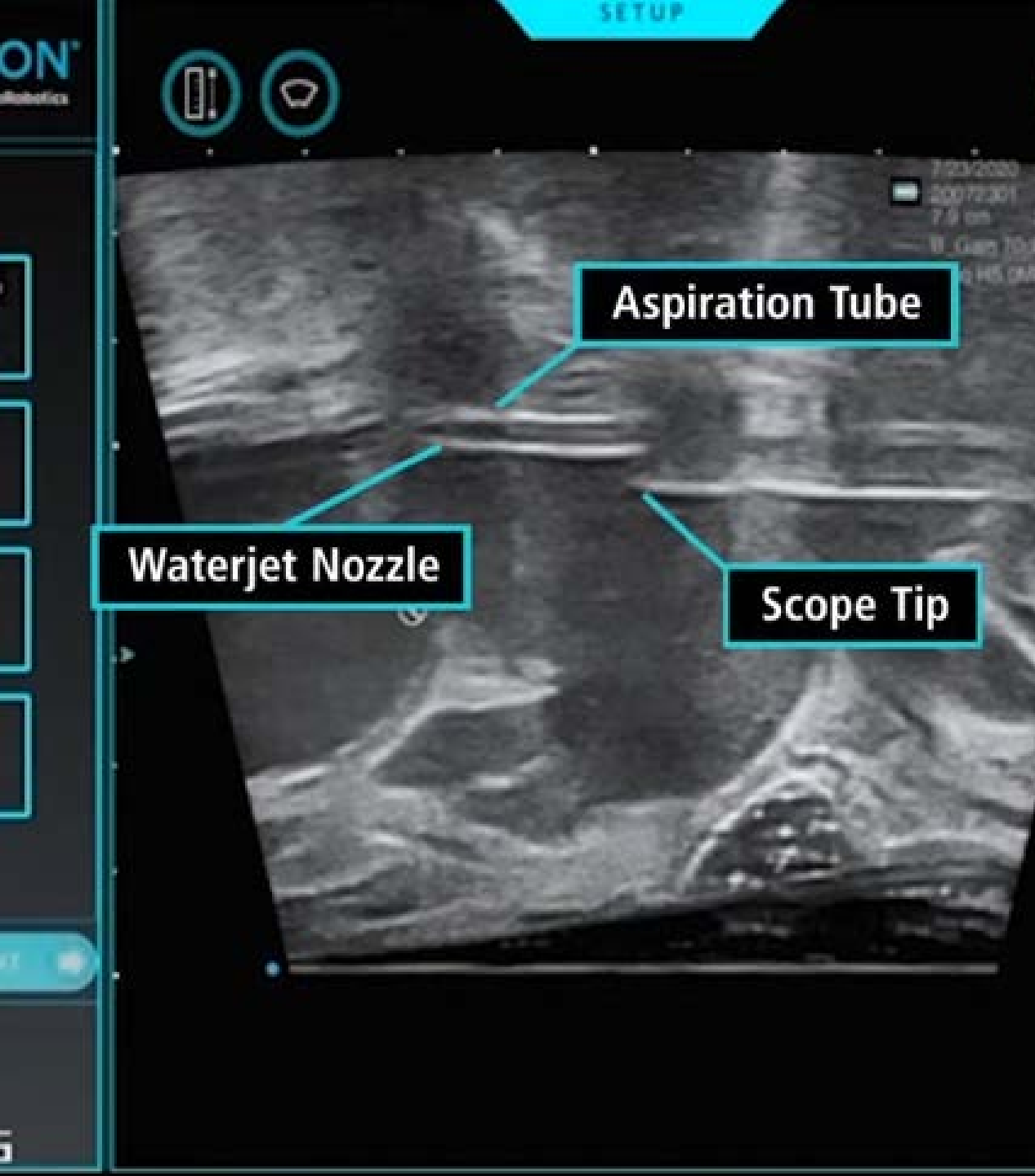
Handpiece Insertion

Shadow from handpiece in Prostate



Verumontanum





Angle Planning

AQUABLATION[®]
Therapy by PROCEPT BiRobotics

Scan Prostate

Prostate ☒ Bladder Neck ☐ Median Lobe ☐

ANGLE 150°

☐ Adjust Veru Protection Zone

RESET

BACK NEXT

TRANSVERSE

09:25:26

PLAN

7/23/2020 9:25:33 AM
20072301
9.5 cm PROCEPT TH
B_Gain 44dB
Freq H4.0MHz

135.0°

24.3 mm

SESSION ID: [icon]

PROCEDURE STEPS

SETUP

- HANDPIECE ✓
- TRUS ✓
- ALIGNMENT ✓

PLAN

- ANGLE ...
- REGISTRATION
- PROFILE

TREAT

TREATMENT

Nozzle Controls

Neck Veru

Nozzle Position: 70.0 mm

System Status: TRUS Connected

Post Treatment

AQUABLATION[®]
Therapy by PROCEPT BioRobotics

System Status

- TRUS Video
- Pump Cartridge Latch
- Aspiration Pump Cover
- Aspiration Tube Guide Switch
- Footpedal Connection
- Motorpack Connection

SAGITTAL

SESSION ID

Depth: 7.9 cm
B_Gain: 70 dB

S

SESSION ID:

PROCEDURE STEPS

SETUP

- HANDPIECE
- TRUS
- ALIGNMENT

PLAN

- ANGLE
- REGISTRATION
- PROFILE

TREAT

- TREATMENT

Nozzle Controls

Neck

Veru

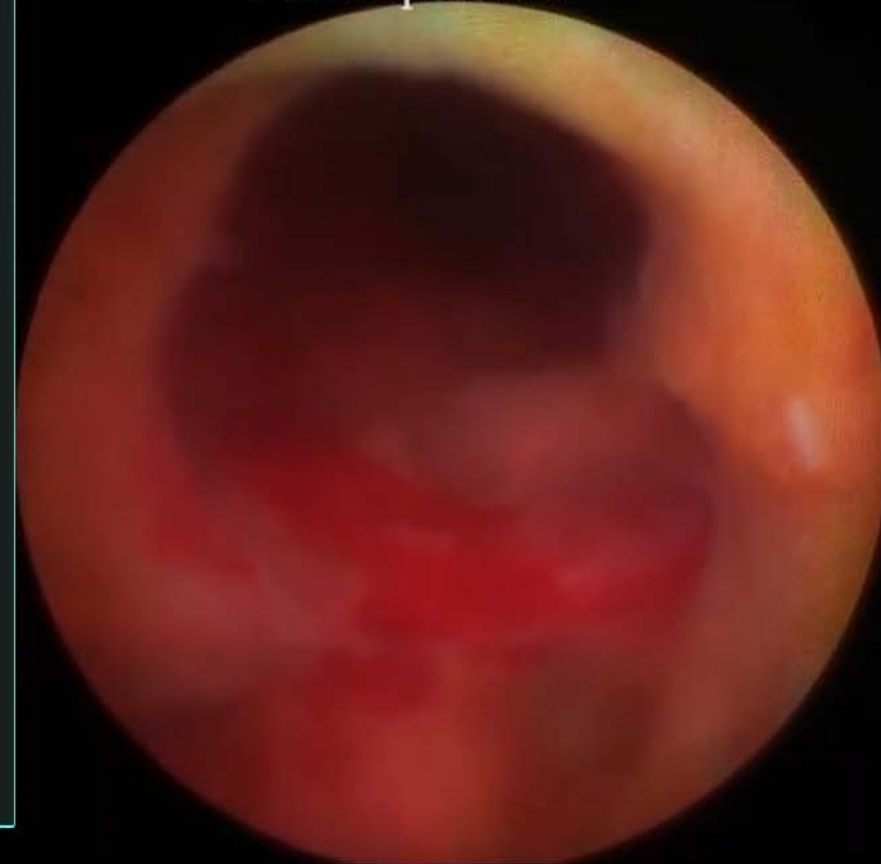
Nozzle Position: 60.1 mm

700

System Status

TRUS Connected

Post Aquablation

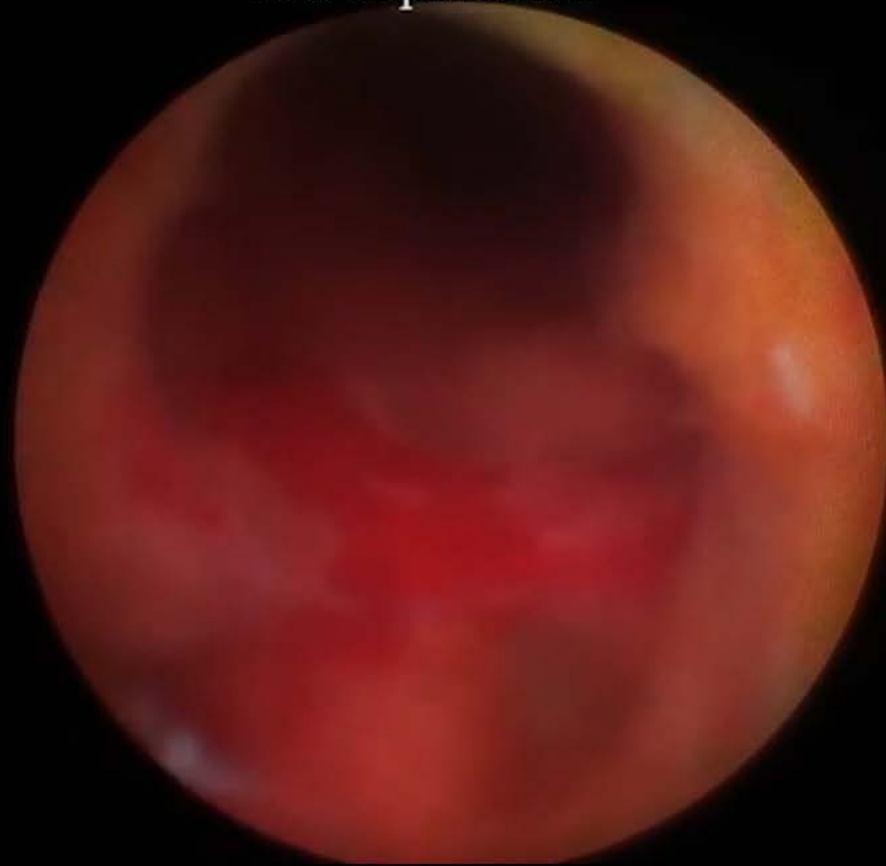


AQUABLATION CLOT EVACUATION AND FOCAL BLADDER NECK CAUTERY

Evacuation Prostate Tissue / Blood Clots



Post Aquablation



Surgical BPH Treatment (New vs. Old Gold Standard)

5 Year Results Aquablation vs TURP

30-80 grams

Randomized, multi-center, blinded

	Aquablation	TURP
Patients	58	32
IPSS (improvement)	15	13
Change Qmax (Peak Flow Rate) (improved)	125% (11cc/sec)	89% (6cc/sec)
Sexually Active	80%	82%
No Ejaculation	10%	75%
Retreatment at 5 year (Rx or Sx)	6%	12%
Procedure Time Minutes	40	36
Length of Stay / Foley In	1.4 / 1 day	1.4 / 1 day

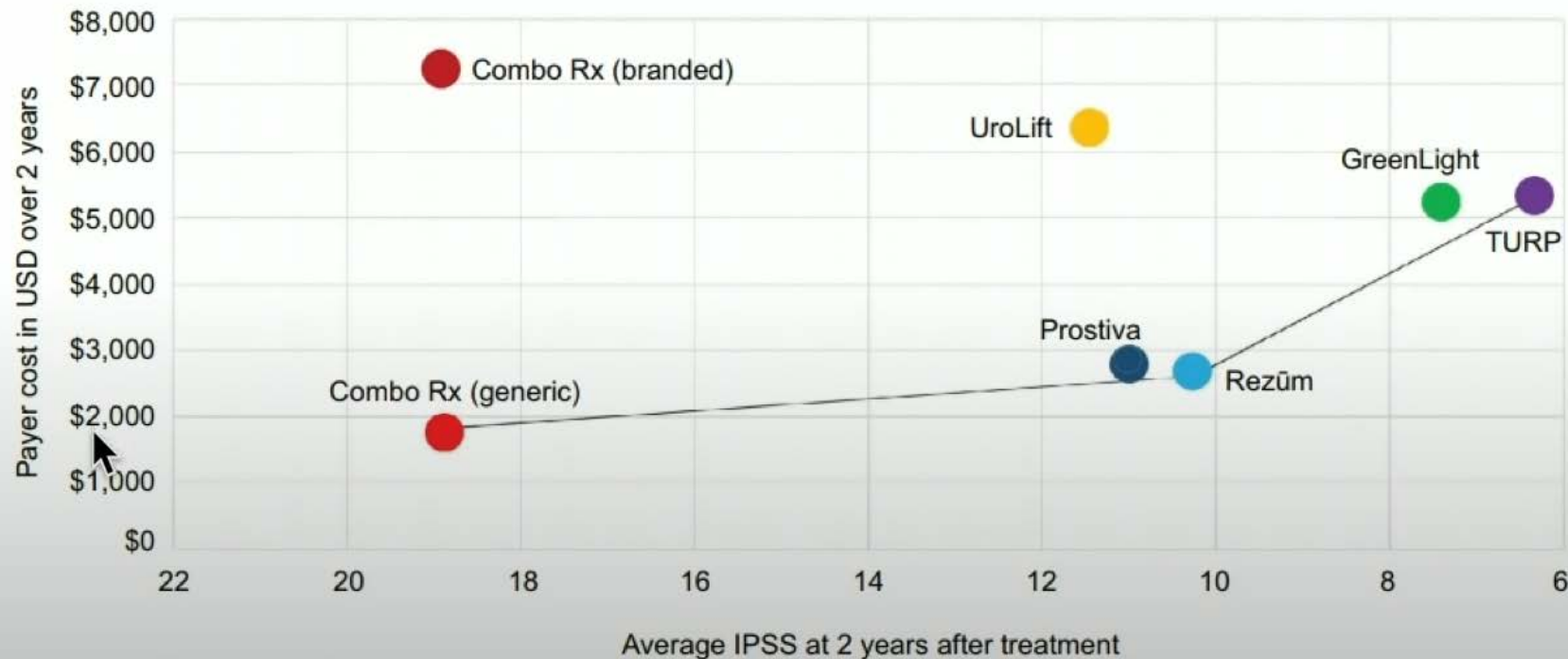
Surgical BPH Treatment

Aquablation (AA) Future

- **Then**: AA was in MIST (Minimally Invasive Surgical Therapies) category (prostate size <80gm)
 - Showing better efficacy than other MIST and comparable with TURP
- **Now**: AA with new 5-year data and doing surgery on all prostate sizes, it is proving comparable to HoLEP and simple prostatectomy (open or robotic)
- **Future**: Guideline will acknowledge it is appropriate for prostate glands small through very large (30 to >150 gm)

Two Year Comparison of Cost vs Efficacy of Various Treatments by IPSS

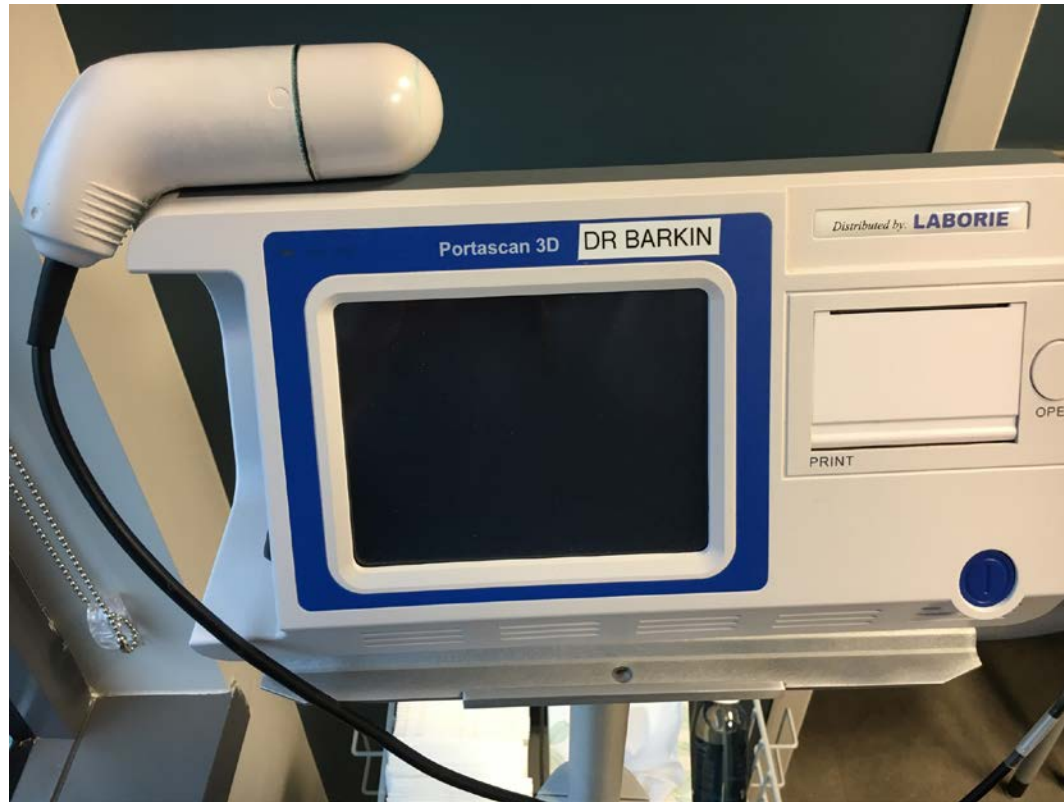
Attribute	Statistic	ComboRx		Rezūm®	UroLift®	Prostiva®	Greenlight®	TURP
		Medicare Part D price	Branded price					
Cost	Mean at 2 years	\$1,736	\$7,082	\$2,582	\$6,386	\$2,855	\$5,099	\$5,181
IPSS	Mean at 2 years	18.9	18.9	10.2	11.4	10.9	7.4	6.4
Cost-effectiveness of Rezūm versus other ^a	ICER at 2 years	\$97	-\$518	Base comparator	-\$3,058	-\$352	\$900	\$686
	Dominated	No	Yes	NA	Yes	Yes ^b	No	No
Cost-effectiveness of TURP versus other ^a	ICER at 2 years	\$276	-\$1,523	\$6,863	-\$240	\$509	\$83	Base comparator
	Dominated	No	Yes	No	Yes	No	No	NA



My BPH Evaluation Pathway

- IPSS
- UA (C/S)
- PSA* / DRE
- Bladder Scan by Ultrasound
- Renal US or CT
- Urocuff Test
- Flexible Local Cystoscopy + Transrectal Ultrasound of Prostate for Volume (TRUS) (+ / - biopsy of prostate)

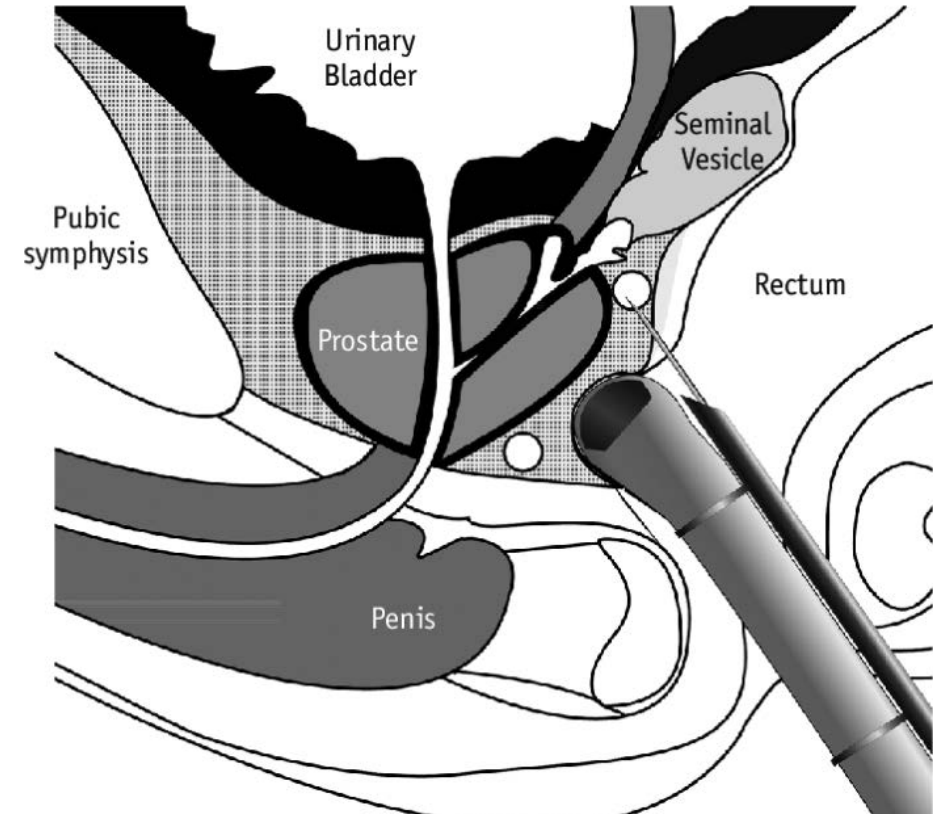
Bladder Scan



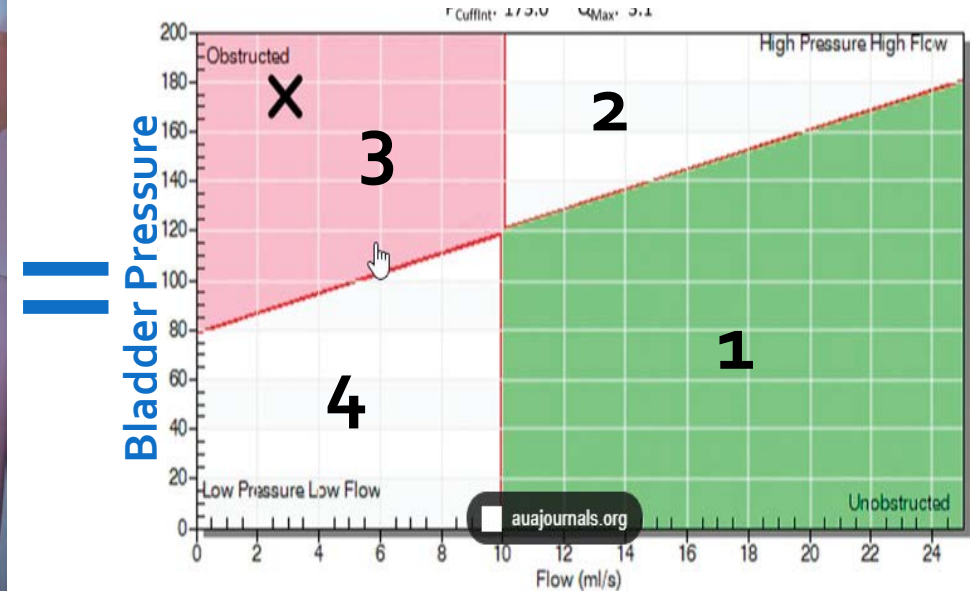
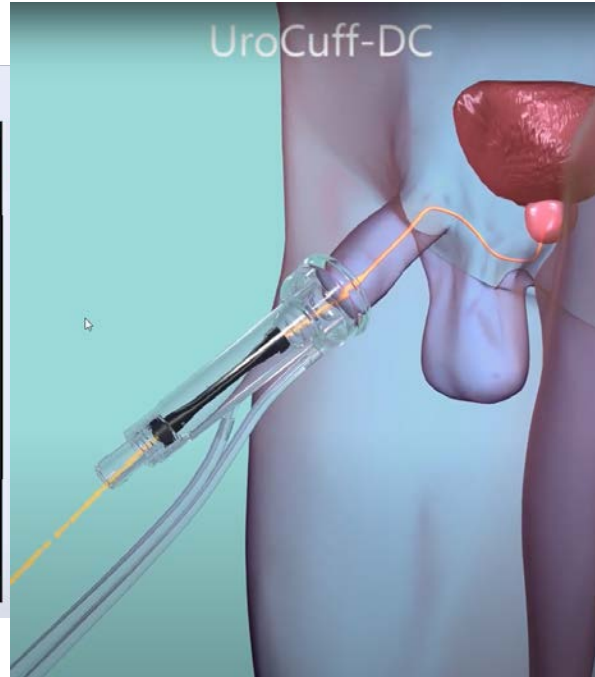
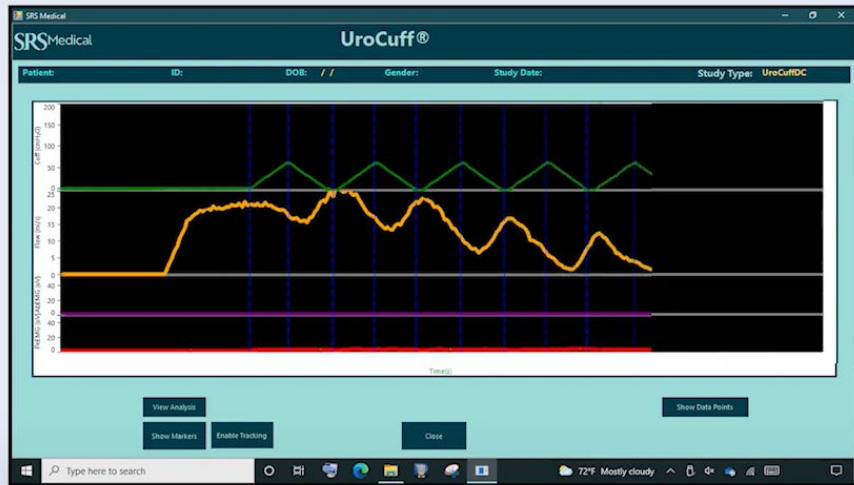
Transrectal Ultrasound (TRUS)



For prostate volume (cc's, gm, cm³)
For prostate biopsy



UroCuff Test



- Noninvasive test for pressure flow for these patients with LUTS:

1 Green – unobstructed —→ 2 White = High Pressure High Flow —→ 3 Pink = Obstructed —→ 4 White = low pressure low flow

BPH Treatment – My Discussion with Patients

- Treatment

- Conservative Management

- RX

- Positive:

- No SX

- Negative:

- 3-6 pills/day

- Potential Long-Term S/E

- Lab changes possible

- Need close F/U

- Poor Compliance (70% stop after 6-12 months)

- Patients over age 60 take an average 7 meds

- MIST (Minimally Invasive Surgical Therapies)

- ✓ See Table 3

- ✓ Size and Prostate Shape Matters

- Help determine which treatment

- Study – 1700 men: 20% over 75 gm; 9% over 100gm

- ✓ Most show 8 points improvement in IPSS; 3 pts improvement in urine flow rate

BPH Treatment – My Discussion with Patients

- More Invasive Therapies

- See Table 3
- All Sizes – over 100 gm (large)
 - ✓ TURP* (probably need 2)
 - ✓ HoLEP
 - ✓ Aquablation*
- Over 150gm (very large)
 - ✓ HoLEP
 - ✓ Aquablation*
 - ✓ Simple open or robotic prostatectomy
 - ✓ PAE*
- My Aquablation experience
 - ✓ ~ 65 – 70 cases since 6/2020
 - ✓ Size 40gm to 260gm
 - ✓ Comparable S/E profile to TURP. Unofficially, 80-90% either off catheter or off RX.

*Not on Official Guidelines

Final Thoughts



- Think LUTS when you think of BPH
 - Remember IPSS Sheet
 - Conservative therapy for mild-moderate cases; successful 50% of the time.
 - ✓ Hard for patient to achieve / maintain
- When I see patients:
 - 1 - need directive evaluation (upper and lower GU tract evaluation)
 - 2 – discussion
 - ✓ Is a procedure really worse than adding 1-4 RX to someone or an avg of 7 RX/day
 - ✓ Is RX a “fur-lined trap”?
 - ✓ Surgery; Lots of Choices
 - ✓ Determining factors
 - Size/Shape Prostate and patient comorbidities
 - Willingness for surgery treatment

“Change is the only constant in Life ” (the original quote) – Heraclitus 500BC₄₇

