

Benign Prostatic Hyperplasia

(Minimally invasive surgical treatment)

No Disclosures

INTRODUCTION

- ❑ BPH common condition in men over 50

Symptomatic BPH is found in:

- ❑ 14% of men aged 50-59 years old
- ❑ 37% between 60-69
- ❑ 39% over 70 years

Robson J.urol.1964

- ❑ Between 50 and 80 years LUTS are X 3

Guess et al prostate 1990

Monopolar TURP

- ❑ GOLD standard
- ❑ MIST popular alternative
- ❑ So many different techniques used
- ❑ Better tolerated than traditional surgery
- ❑ All calibrated upon TURP
- ❑ BPH care costs millions of dollars / year

AIMS

- Overview of minimally invasive procedures
- Summarize and compare data
- Limits of the question

METHODOLOGY



ScienceDirect



HISTORICAL REVIEW

1ST resectoscope (1929) Maximillian Stern

Basic light use



Modified in 1931 Théodore Davis

Section

diathermic coagulation



Enhanced by Joseph Mc Carthy 1931

Bakelite

Optics

Pedal Foot device



HISTORICAL REVIEW

TURP became popular in USA 1930-40

1st publications

Clamps against leaks (Cunnigham)

Very shy introducing in Uk

By Terrence Millin

WW II :

- Stop tecgnic progression
- 1945 Millin technique



Monopolar TURP

Monopolar TURP

Known complications

- Turp sd 1-2%*
- Blood 4.4%
- Incontinence 0.6-5%
- Urethral stricture 4%
- Retro ejaculation 70-90%
- Perforation
- ureteral/uretral injury

Minimally invasive techniques

•NO LASER TECHNIQUES

• **NO LASER TECHNIQUES**

- TURP M or B
- Urolift
- Systeme REZUM
- TUMT
- TUNA
- TUIP
- Aqua ablation

• **NO LASER TECHNIQUES**

- TURP M oR B
- UroLift
- Systeme REZUM
- TUMT
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- TUIP
- Aqua ablation

• **LASER TECHNIQUES**

- HoLep
- Yag
- KTP(potassium Titanyl phosphate)
- ThulEp

• **NO LASER TECHNIQUES**

- TURP M oR B
- Urolift
- Sytème REZUM
- TUMT
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- Aqua ablation

• **LASER TECHNIQUES**

- HoLep
- Yag
- KTP(potassium Titanyl phosphate)
- ThulEp

• **OTHERS**

- Stent
- EmboliZation

HOW TO CHOSE ?

ALGORYTHM

patient's Criteria

Tolérance fo the procédure

Accessibility

Safety

Recovery

Technique's criteria

Ease of the technique (learning curve)

Local or general anesthesia requirement

Generalizable

Formerly...

Ancient procedures

- Prostate balloon dilation
- Prostatic stents
- Transurethral microwave therapy (TUMT)
- Transurethral needle Ablation (TUNA)

PROSTATE BALLOON DILATION



The Journal of Urology
Volume 144, Issue 1, July 1990, Pages 83-87



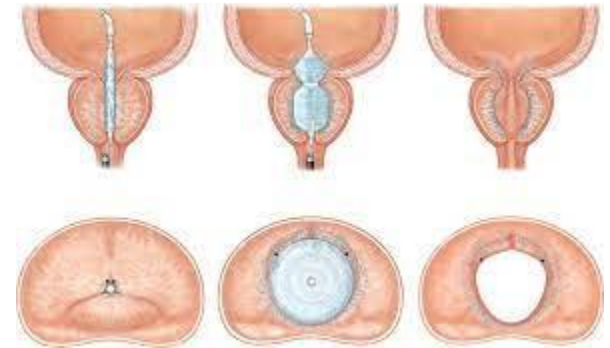
Endoscopic Balloon Dilation of the Prostate: Early Experience

S. Larry Goldenberg ¹, Ramon A. Perez-Marrero, Laurence M. Lee, Laurel Emerson

❑ Trial in 1990

❑ Unknown Mechanism:

❑ Low level of evidence



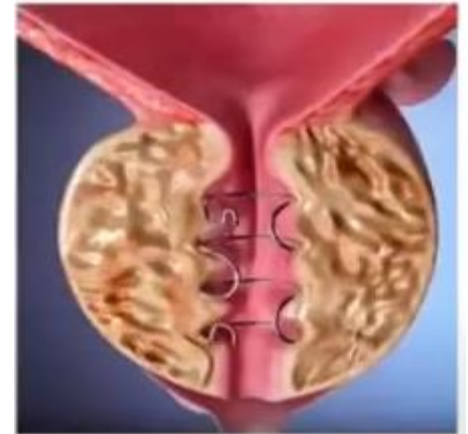
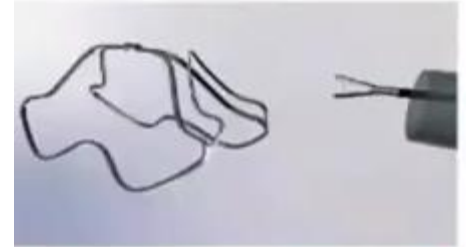
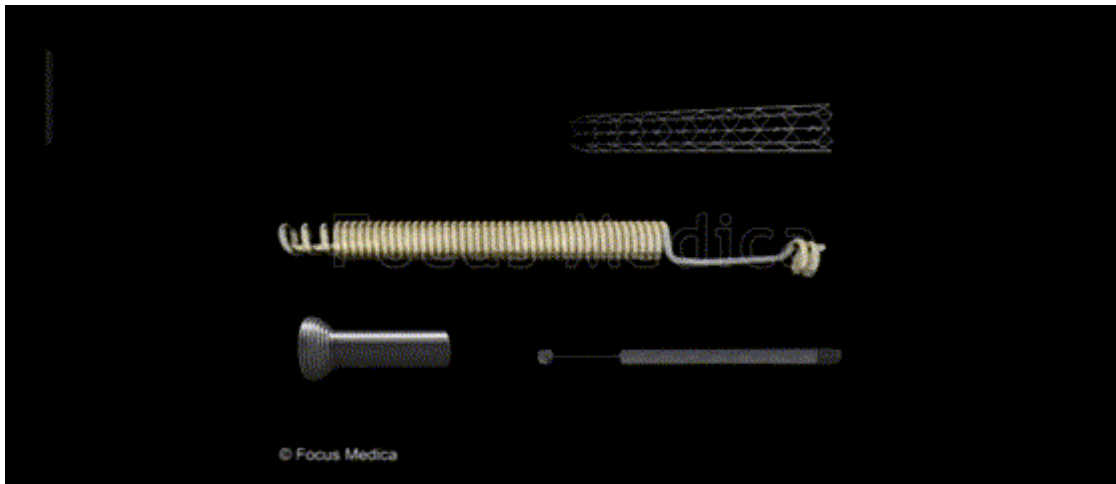
❑ in case of retention with contraindication for surgery

❑ No for AUA EAU

PROSTATIC STENT

Different models

Biomaterial Vs Synth



TRANSURETHRAL MICROWAVE THERAPY

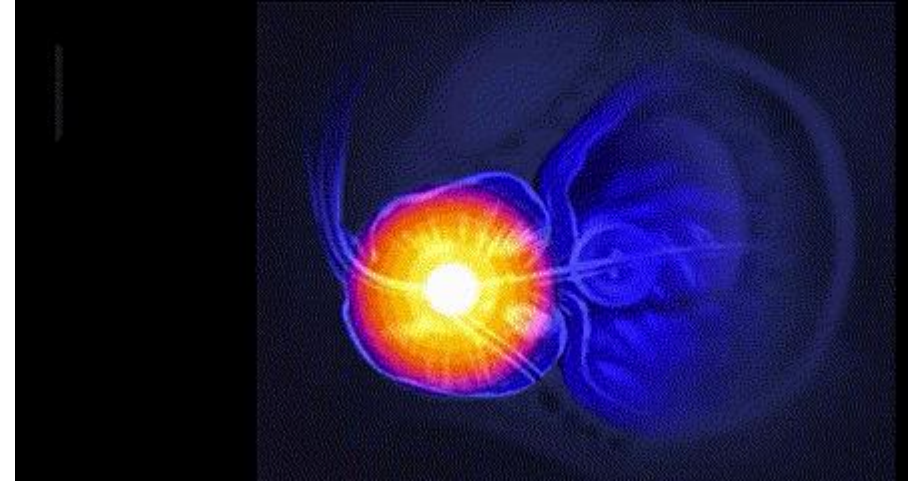


Outpatient (anesthésie locale)
BPH > 30 < 100

23% satisfaction rate
40% to TURP after 4y

30% luts recurrence after 3 y

EAU AUA Optional
obsolete abandoned



Hallin et berlin 1988

De la rosette et al 2002

TRANSURETHRAL NEEDLE ABLATION

TRANSURETHRAL NEEDLE ABLATION

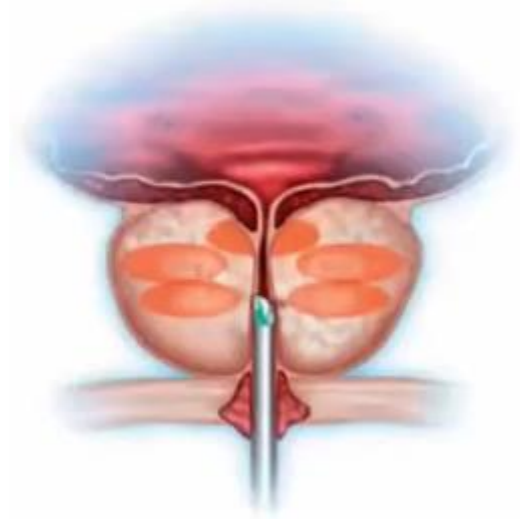
Volume < 80 cc

Local anesthesia

bladder neck sparing

Ejaculation sparing

Not recommended in EAU AUA guidelines



Currently...

Contemporary Techniques

- ❑ Bipolar TURP
- ❑ Prostate Green light Vaporization PVP
- ❑ HoLep (Holmium laser Enucleation of the prostate)
- ❑ ThulLep (Thulium laser Enucleation of the prostate)

Bip –TURP

No TURP sd !



Meta-analyses VS M-TURP

- ❑ same IPSS
 - ❑ better Q max, PVR
- Nessa et al 2008

Complications:

- ❑ 15 vs 28% Hypo nat
- ❑ Transfusion rates
- ❑ TURP Sd still exist !
- ❑ CUA, AUA, EAU

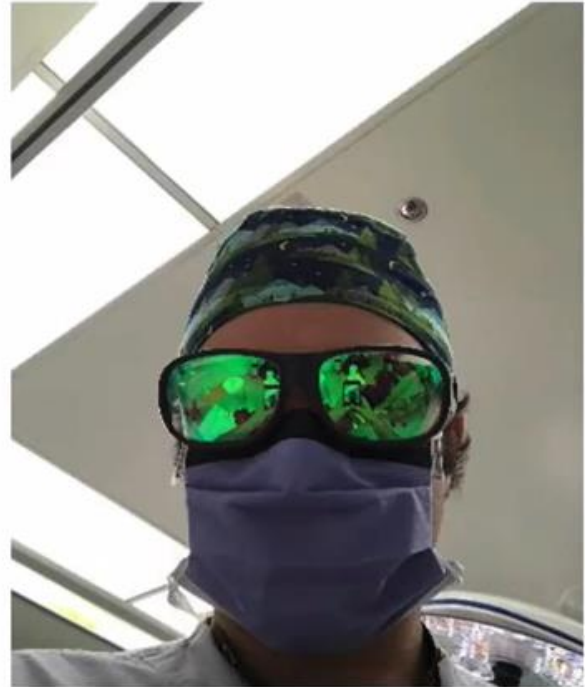
LASER TREATMENTS

LASER TREATMENTS

1998: Fraundeorfer & Gilling

- ❑ **Principel:** Changing light energy to heat
- ❑ **Coag:** low T° proteine denaturation → necrosis
- ❑ **Section:** high T° intra cellular liq vapo → vapo of tissus
- ❑ HIGH BPH volume > 80 cc
- ❑ Enucleation + morcellation

GREEN LIGHT PHOTOVAPORIZATION



GREEN LIGHT PHOTOVAPORIZATION

- ❑ Energy : 40W coag, 80 à 120 W
- ❑ Good Hemostasis
- ❑ Outpatients
- ❑ 24h catheter

for Patients:

- under anti coagulation
- high prostate volume
- No histo -path !!
- Possible greenLEp



GREEN LIGHT PHOTOVAPORIZATION

- **Green Light vs. TURP**
 - Thomas et al. 2016 EJU - GOLIATH Trial
 - RCT Noninferiority trial
 - 281 Patients – 139 GL and 142 TURP

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GOLIATH – 2 YEARS LATER

Table 1 – Evaluating noninferiority of GreenLight XPS Laser System^a

Endpoint	Time point	GL-XPS ^b	TURP ^b	Difference [95% CI] ^c
IPSS score	Baseline	21.2 ± 5.9	21.7 ± 6.4	
	6 mo	6.8 ± 5.2	5.6 ± 4.9	1.2 [-0.0, 2.4] ^d
	12 mo	6.9 ± 6.0	5.7 ± 5.3	1.2 [-0.2, 2.6] ^d
	24 mo	6.9 ± 6.0	5.9 ± 6.1	1.0 [-0.5, 2.5] ^d
Q_{max} (ml/s)	Baseline	9.5 ± 3.0	9.9 ± 3.5	
	6 mo	23.3 ± 10.1	24.3 ± 11.4	-1.0 [-3.7, 1.8] ^d
	12 mo	22.9 ± 10.7	24.7 ± 10.1	-1.7 [-4.5, 1.0] ^d
	24 mo	21.6 ± 10.7	22.9 ± 9.3	-1.3 [-4.0, 1.4] ^d
Complication-free	6 mo	87.3%	83.3%	4.0% [-4.6%, 12.6%] ^d
	12 mo	84.7%	80.5%	4.3% [-5.0%, 13.6%] ^d
	24 mo	83.6%	78.9%	4.7% [-5.0%, 14.4%] ^d

CI = confidence interval; GL-XPS = GreenLight XPS Laser System; IPSS = International Prostate Symptom Score; ITT = intention-to-treat; SD = standard deviation; TURP = transurethral resection of prostate.

^a Intention-to-treat analysis was also performed for IPSS and Q_{max} using each of two approaches for the patients who did not receive treatment in the study: excluding the patients (ie, modified ITT) and imputing their endpoint with the baseline observation. The analyses by intention-to-treat and by treatment received were in agreement.

^b Mean ± SD presented for IPSS and Q_{max}; proportion presented for complication-free.

^c Noninferiority margins (GL-XPS minus TURP): 3 for IPSS, -5.0 ml/s for Q_{max}, and -5% for complication-free endpoint.

^d Noninferiority demonstrated.

GREEN LIGHT PHOTOVAPORIZATION

- **Metaanalyses sparse given limited RCTs**
 - Mainly cohort studies
- **Lai et al. BMJO 2019 Metaanalysis**
 - No difference in IPSS, Qmax, PVR, QoL
 - Lower IIEF scores at 12 months (-0.63 questionable)
 - Longer OR time 15.24 minutes
 - Less blood loss (-13.3g/mL)
 - Shorter hospitalization (-1.83 days)
 - Shorter catheter time (-1.25 days)
 - Increased reop rate (RR 1.81)

HOLMIUM LASER ENUCLEATION OF PROSTATE (HOLEP)

HOLMIUM LASER ENUCLEATION OF PROSTATE (HOLEP)

Elzayat et al. 2005

- 552 patients retrospectively reviewed at 1 year
 - Qmax increased by 200%
 - 75% improvement in AUASS
 - Catheter time 1.4 days
 - Hospital stay 1.5 days
 - Only 1.75% of patients unable to void after surgery

Kuntz et al. 2005

- Size of gland resection had no difference on improvements of AUASS, Qmax, PVR
- Complications slightly higher with larger gland

Surgeon experience is necessary (Placer et al. 2009)

- 2 years of self teaching
- 125 patients divided into 25 consecutive patient groups

HOLMIUM LASER ENUCLEATION OF PROSTATE (HOLEP)

Versus TURP

- Kuntz et al. 2004
 - 200 patients
 - Average size 50g both groups
 - HoLEP had less catheter time (27.6 v 43.4h), blood loss (13 v 18pt), and hospital stay (53.3 v 85.8h)
 - Operative time longer (94.6 v 73.8min)
 - AUASS and Qmax decreased significantly in both groups, and HoLEP had more dramatic decrease at 1, 3 and 12 months
 - No significant difference in AUASS and Qmax at 36 months
 - Both still great (2.7/3.3 for AUASS) and ~27 for Qmax
- Gilling et al. 2012
 - 12 year re-operative rate
 - 0% for HoLEP
 - 10% for TURP
 - **Re-operative rate 0-2% for HoLEP**

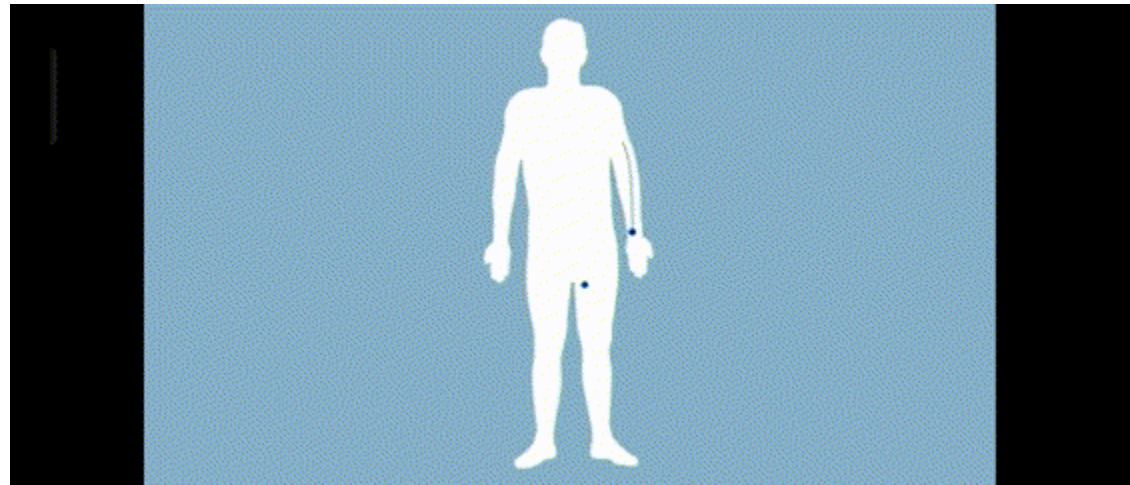
Near future...

THE FUTURE

- **Prostate Artery Embolization**
- **Prostatic Urethral Lift - Urolift**
- **Aquablation - Aquabeam**
- **Water Vapour Therapy - Rezum**

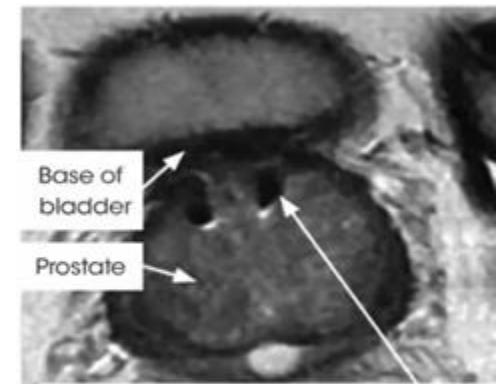
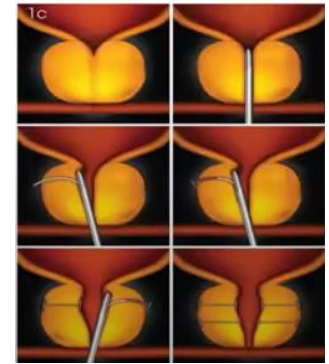
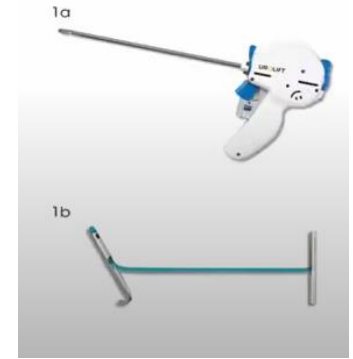
PROSTATE ARTERY EMBOLIZATION

- Embolizing prostatic arteries
- Reduce blood flow to prostate.
- Ipsos after 12 mo = TURP
- Heterogeneous non inferiority study outcomes
- EAU, AUA : waiting



UROLIFT

UROLIFT

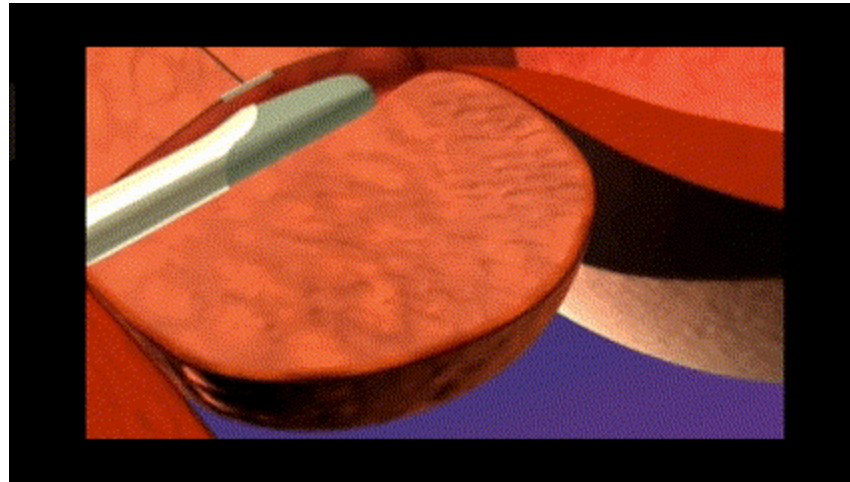


MRI: T2-weighted image

Indication:

- Young patients
- Ejaculation sparing
- Contraindication (or refusal) anesthesia
- Prostate volume <80 cc
- Problem : may interfere with prostatic MRI later

UROLIFT



UROLIFT

- Roehrborn et al. 2017 CUAJ
 - 206 Patients – 140 Urolift, 66 Sham

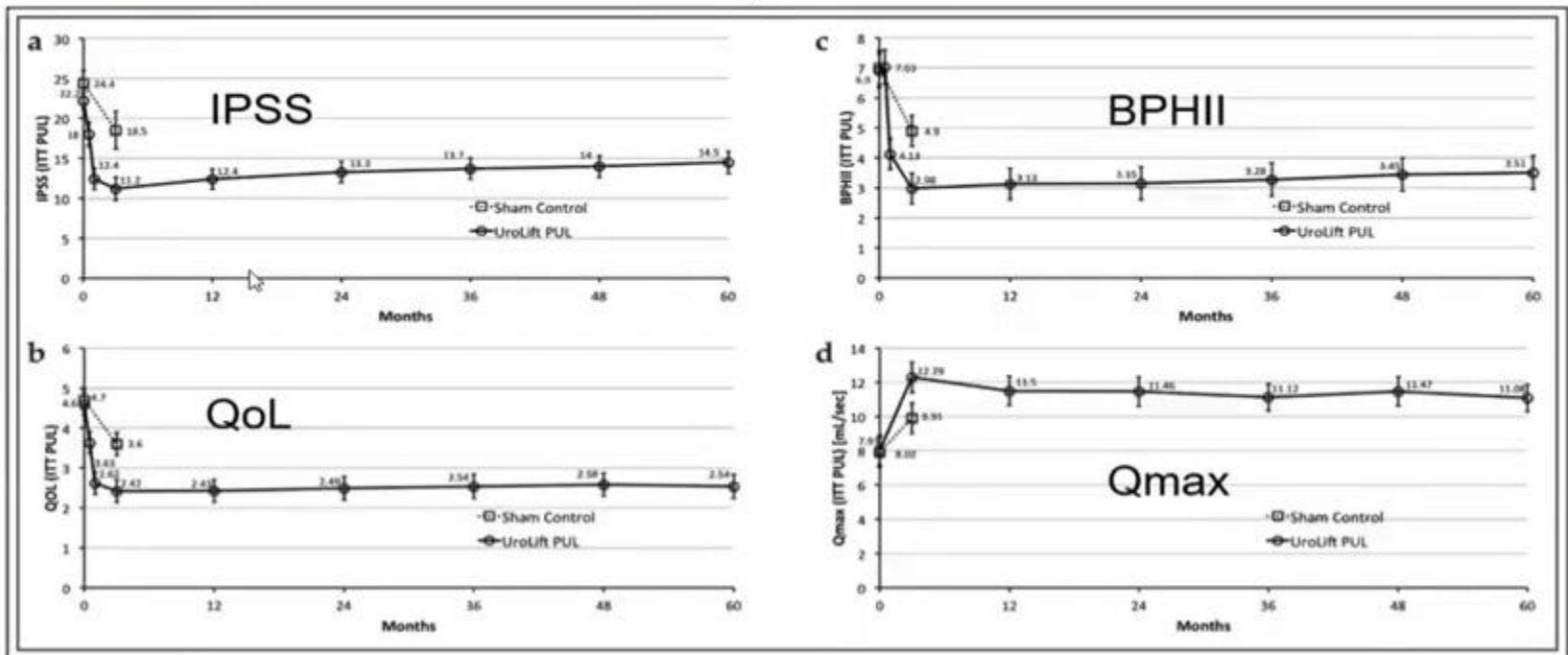


Figure 2. Intent to Treat outcomes for PUL and Sham control for a) International Prostate Symptom Score (IPSS); b) Quality of Life (QoL); c) BPH Impact Index (BPHII); d) peak urinary flow rate (Qmax).

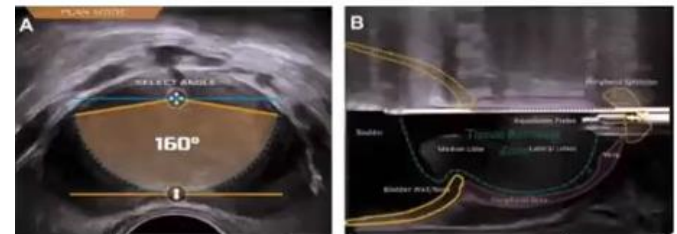
UROLIFT

TABLE 1. Adverse events over 5 year course of study

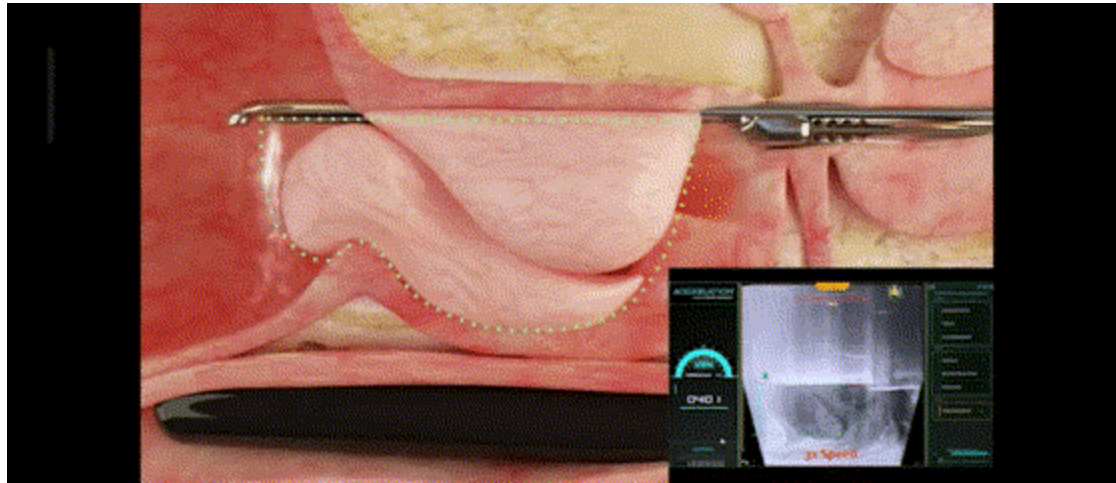
Time period [months]	0-3	4-12	13-24	25-36	37-48	49-60
Total available subjects	140	139	130	118	108	96
Total subject-months (SM)	413.6	1210.3	1463.8	1324.9	1186.6	1056.3
Related adverse events [total events]	162	15	6	4	2	1
Related adverse events [subjects]	100	12	6	2	2	1
% SM with adverse event per total SM:						
Abdominal pain	0.3%					
Bladder spasm	0.3%	0.09%				
Chills (rigors)				< 0.01%		
Diarrhea	0.2%					
Dizziness	0.2%					
Fever (pyrexia)	0.06%					
Vomiting	0.02%					
Hypotension	0.04%					
Orchitis/epididymo-orchitis	0.3%					
Painful erection	0.2%					
Urinary retention	0.4%					
Urethral stenosis (stricture)	< 0.01%	< 0.01%				
Prostatitis	0.4%	< 0.01%	0.06%			
Urinary tract infection	0.1%	0.03%	0.03%	0.03%		
Pelvic pain	6%	1%				
Hematuria	4%	0.2%	0.3%		0.07%	0.07%
Dysuria	9%	1%	1%	1%		
Urinary urge incontinence	3%	3%	2%	1%	1%	1%
Other	4%	3%	5%	4%	3%	3%

AQUABLATION

- ❑ require endorectal US
- ❑ Under pressure water Jet
- ❑ Vessels and capsule sparing
- ❑ Need RCT for confirmation
- ❑ EAU AUA subject to RCT outcomes



AQUABLATION



Aquablation of the Prostate for Symptomatic Benign Prostatic Hyperplasia: Early Results

Omid Yassaie¹, Joshua A Silverman¹, Peter J Gilling^{2,3}

Aquablation among novice users in Canada: A WATER II subpopulation analysis

Kevin C. Zorn, MD¹; S. Larry Goldenberg, MD²; Ryan Paterson, MD²; Alan So, MD²; Dean Elterman, MD³; Naeem Bhojani, MD¹

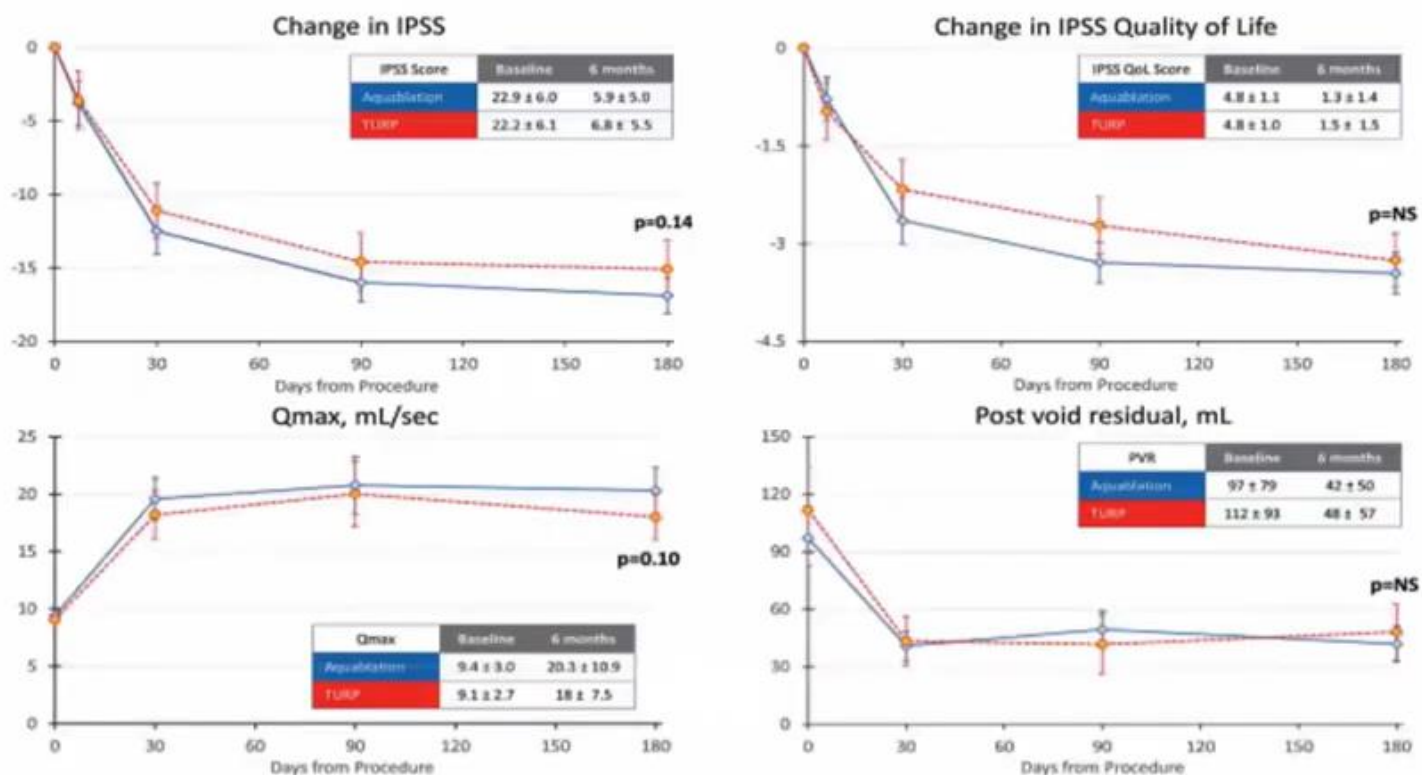


Figure 2. Change in I-PSS, I-PSS quality of life, maximum urinary flow (Qmax) and PVR by treatment and time

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grades by group as possibly, probably or definitely related to procedure and/or device

Clavien-Dindo	No. Adverse Events/No. Pts (%)		p Value (Fisher test)
	Aquablation	TURP	
Grade 1:	63/39 (33.6)	41/27 (41.5)	0.3350
Bladder spasm	3/3	1/1	1.0000
Bleeding	12/11	7/7	0.7995
Dysuria	12/12	5/5	0.7912
Pain	5/5	3/3	1.0000
Retrograde ejaculation	8/8	16/16	0.0012
Urethral damage	1/1	1/1	1.0000
Urinary retention	11/9	4/4	0.7730
Urinary tract infection	2/2	0/0	0.5371
Urinary urgency, frequency, difficulty, leakage	4/4	1/1	1.0000
Other	5/5	3/3	1.0000
Grade 2:	20/19 (16.4)	15/11 (16.9)	1.0000
Bladder spasm	4/4	2/2	1.0000
Bleeding	1/1	0/0	1.0000
Dysuria	0/0	1/1	0.3591
Pain	1/1	2/2	0.2932
Urinary tract infection	9/9	5/5	1.0000
Urinary urgency, frequency, difficulty, leakage	2/2	3/2	0.6191
Other	3/3	2/2	1.0000
Grade 3a:	4/4 (3.4)	2/2 (3.1)	1.0000
Bleeding	1/1	1/1	1.0000
Urethral stricture or adhesions	3/3	1/1	1.0000
Grade 3b:	3/3 (2.6)	3/3 (4.6)	0.6684
Bleeding	2/2	2/2	0.6191
Urethral stricture or adhesions	0/0	1/1	0.3591
Urinary retention	1/1	0/0	1.0000
Grade 4:	1/1 (0.9)	0/0	1.0000
Arrhythmia	1/1	0/0	1.0000

- Retrograde ejaculation only significant difference in morbidity
- Reop rate
 - TURP - 1 (1.5%)
 - Aquablation - 3 (2.6%)

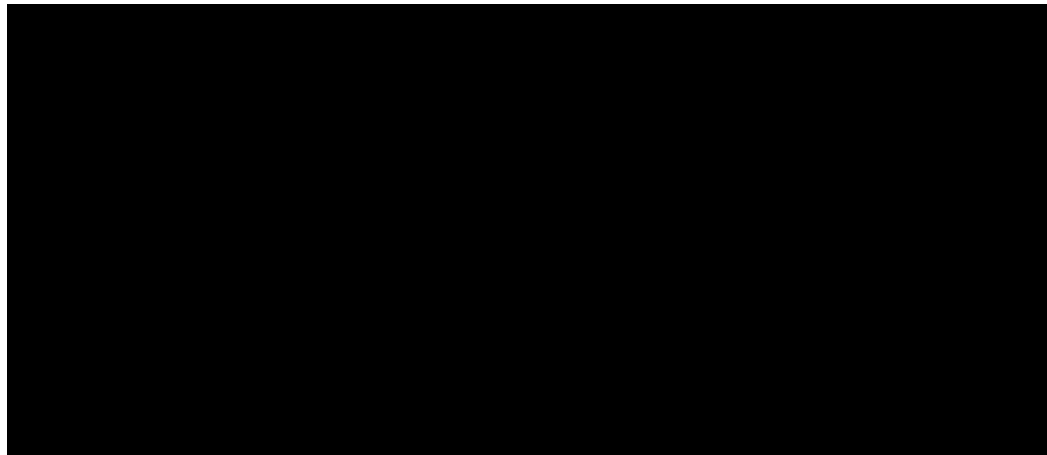
WATER VAPOUR THERAPY - REZUM

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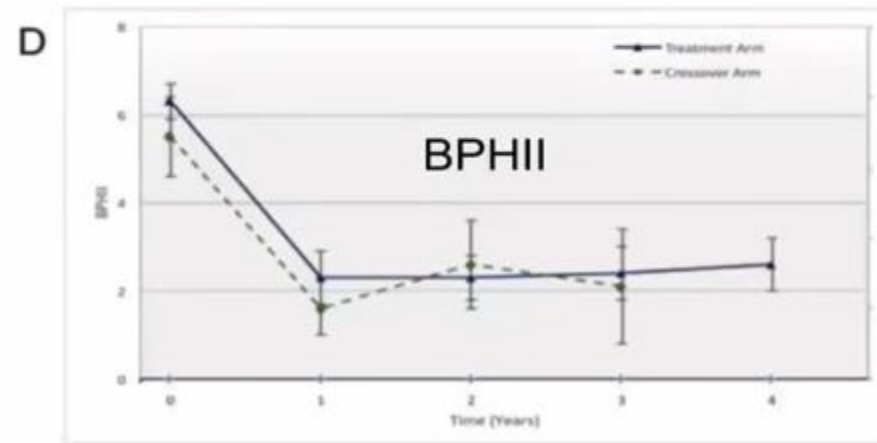
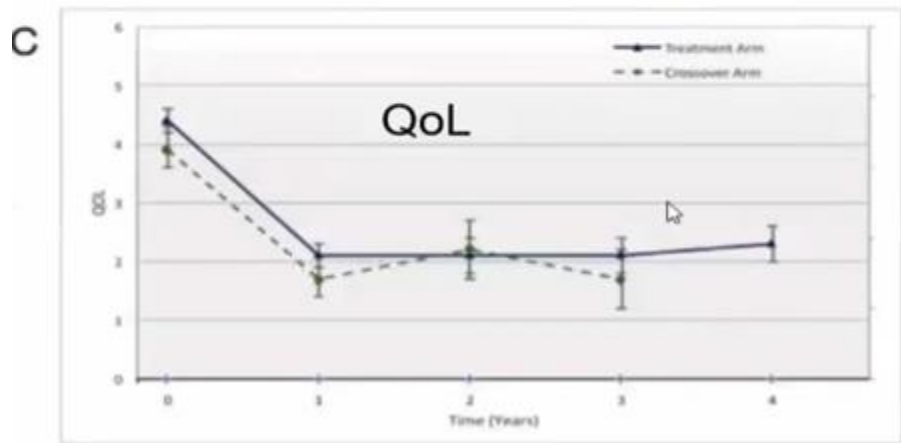
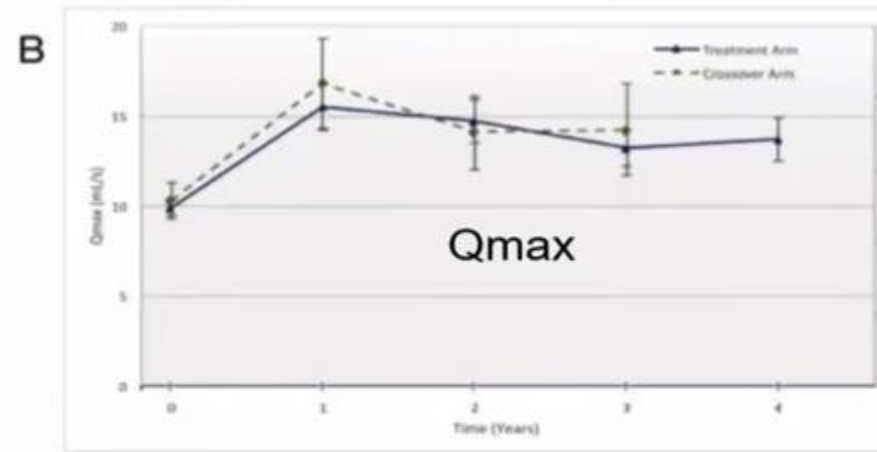
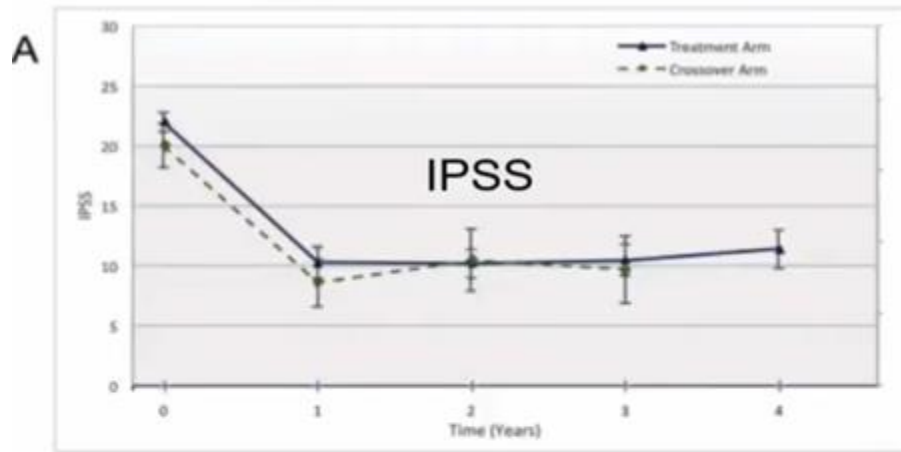
- ❑ intra prostatic Water steam
- ❑ Local anesthesia/ outpatient?
- ❑ 1 cm penetrating needl for 9 secondes
- ❑ 1 side each
- ❑ FDA 2015
- ❑ Nice and health 2018



WATER VAPOUR THERAPY - REZUM



WATER VAPOUR THERAPY - REZUM



WATER VAPOUR THERAPY - REZUM

- ❑ No comparative study Vs TURP
- ❑ many studies with many bias
 - ❑ short cohortes
 - ❑ Lost patients
 - ❑ patients leavin CT
 - ❑ Medical trt Bias ...
- ❑EAU, AUA (sous reserve)
- ❑ waiting for outcomes

COMPARAISON

TABLE 105-1 Expected Complication Rates after Endoscopic Benign Prostatic Hyperplasia Procedures

	M-TURP	B-TURP	TUNA	TUMT	HOLEP	PVP	TUVP	TUIP
Transient urinary retention	4.3-6.8 ^a	3.3-3.7 ^b	23 ^c	10-24 ^d	2.7-5.9 ^e	5.2-9.9 ^e	2-9.8 ^f	4.9-11.3 ^g
UTI	4.1-6.2 ^a	2.6-8.4 ^c	4 ^c	15-20 ^h	0.9-2.7 ^e	4.2-12 ^e	0 ^f	IE
Bladder neck contracture	2-3.2 ^a	0.5 ^b	IE	0 ^d	1.2-1.5 ^e	1.1-5 ^e	0.5-1 ^f	IE
Urethral stricture	3.4-4.1 ^a	0.5-4.7 ⁱ	0.5 ^e	0-2 ^h	1.9-4.4 ^e	1-6.3 ^e	1.9-3.3 ^f	2.9-8.8 ^g
Incontinence	0.6-1.5 ^a	0-1 ⁱ	IE	IE	0.9-1.1 ^e	0-0.4 ^e	0-2 ^f	0.3-1.8 ^g
Blood transfusion	2-4.4 ^a	1.5-2.3 ⁱ	Very rare	0 ^d	0-1 ^e	0 ^e	0-0.5 ^f	1.1 ^j
Clot retention	4.9-7.2 ^a	2.7-7.9 ⁱ	IE	1 ^d	0 ^h	0 ^h	0-0.5 ^f	IE
Postoperative hematuria	3.5-15.7 ^a	1 ^b	6-28 ^c	1-26 ^d	0 ^h	0.7 ^h	0 ^f	4.3 ^j
Dysuria	0.8 ^a	0 ^b	8-14 ^c	14 ^d	1.2 ^h	8.5-13.9 ^e	2.9 ^f	IE
Urgency	2.2 ^a	0.2 ^b	10 ^c	IE	5.6 ^h	0 ^h	0 ^f	IE
Storage symptoms	IE	IE	IE	18-31 ^d	IE	IE	21 ^f	IE
Reoperation for non-BPE cause	1.1 ^a	0.2 ^b	0 ^c	IE	1.9-2.8 ^e	IE	5.4 ^f	9.6-18.4 ^g
Reoperation for BPE	0.5 ^a	0.2 ^b	19 ^c	4 ^c	0 ^e	0.7-5.6 ^e	2.4 ^f	IE
Capsular perforation	0.1 ^a	0 ^b	IE	IE	0.2 ^h	0 ^h	0 ^f	IE
Conversion to TURP	n/a	0 ^b	n/a	n/a	0 ^h	3.5 ^h	0 ^f	IE
TUR syndrome	0.8-2.5 ^a	0 ^b	0 ^c	0 ^d	0 ^h	0 ^h	0 ^f	IE
Bladder mucosal injury	0 ^a	0 ^b	0 ^c	IE	3.3 ^h	0 ^h	0 ^f	IE

TABLE 105-2 Expected Change in Objective Measures at 12 Months (Mean Change ± Standard Deviation)

	M-TURP	B-TURP	HoLEP	PVP (120 W)
Decrease in AUA symptom score	71% ± 11	71% ± 10	79% ± 11	67% ± 9
Decrease in prostate volume	46% ± 19	46% ± 5	59% ± 14	44% ± 12
Decrease in PVR	77% ± 19	83% ± 14	85% ± 13	84% ± 14
Increase in Qmax (mL/sec)	12.1 ± 6	13.3 ± 4	17.1 ± 4	12.5 ± 2

LUTS + surgical indication or failing insuff medical trt



high risk Patient

yes

No



Chir + anesth possible



yes

No



possible anti coag



yes

No



Prostate Volume

- 30 cc

+ 80 cc

30 à 80 cc



- TUIP
- TURP



- RTUP
- Laser enucl
- Vapo laser
- Bip enucl
- Urolift



- AVH
- HoLep
- Vapo laser
- Bip enucl
- ThuLep
- RTUP



- Vapo laser
- Enucl laser



- Urolift

Résumons !

Conclusion

- ❑ Non exhaustive
- ❑ MIST are safe and effective BPH alternative (contraindication)
- ❑ Less side effects
- ❑ Faster recovery
- ❑ Discuss different options, issues and outcomes with patients

Thank you for your attention