PD61-07

Global Greenlight Group: Largest international Greenlight experience for benign prostatic hyperplasia

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Introduction

- Greenlight photoselective vaporization (GL-PVP) is a recognized and accepted treatment modality for benign prostatic hyperplasia
- Hemostatic benefits of GL make PVP preferred treatment in anticoagulated men
- Comparable long term outcomes to transurethral resection of the prostate
- Shorter hospitalization and catherization times

Aim

- Descriptive analysis to characterize the global state of GL-PVP
- Pooled patient data from multiple international centers

Methods – Data Collection

- Retrospective analysis of data prospectively collected from 3809 patients who underwent GL-PVP with the XPS 180W system between 2011-2019
- 8 expert surgeons from 7 international referral centers

Methods – Data Collection

Patient Demographics

- Age, BMI
- TRUS, PSA, PSA density
- Previous TURP
- IPSS, QoL, Qmax, PVR
- Anticoagulation status, pharmacological treatment

Peri-operative

- Laser and operative time, energy used
- # of fibers used
- Intraoperative transfusion rates and complications

Post-operative

- Hospital stay
- 30-day readmission
- Clavien-Dindo postoperative adverse events
- 3, 6, 12, 24, 60 month IPSS, QoL, Qmax, PVR PSA

Results – Patient Demographics

Parameters	Median (interquartile range) or Mean +/- SD or Number (percentage)
Age	**70** (64 – 77)
BMI	26.1 (24.0 – 29.0)
TRUS prostate volume (mL)	**65** (47 – 90)
PSA (ng/mL)	3.11 (1.8 – 6.0)
PSA density (ng/mL/cc)	0.048 (0.028 – 0.082)
Median lobe presence	628 (**36.5%**)
SHIM	17 (12-21)
IPSS	22 (19 – 27)
QoL	4 (3 – 5)
Qmax (mL/s)	6.3 (4.0 – 9.0)
PVR (mL)	122 (32 – 291)
Previous TURP	157 (6.4%)
Use of 5-ARI	1296 (35.4%)
Use of Alpha-Blockers	2826 (77.4%)
Use of anticoagulants	1261 (34.2%)
Pre-operative Foley	1183 (**35.3%**)
ASA	
- ASA 1	462 (21.0%)
- ASA 2	1106 (50.2%)
- ASA 3	617 (28.0%)
- ASA 4	20 (0.9%)

Results – Operative Characteristics

Parameters	Median (interquartile range) or Mean +/- SD or Number (percentage)
TRUS prostate volume (mL)	**65** (47 – 90)
OR time (min)	62 (45 – 85)
Laser/OR time ratio	0.44 (0.31 – 0.55)
Energy used (kJ)	**250** (167 – 367)
Energy used/preoperative prostate volume (kJ/mL)	**3.90** (2.87 – 5.00)
- < 3kJ/cc	1158 (31.7%)
- 3-4 kJ/cc	883 (24.2%)
- >4 kJ/cc	1610 (44.1%)
Fibers used	
- 1	2906 (**92.5%**)
- 2	219 (7.0%)
- 3+	17 (0.5%)

Results – Operative Characteristics

Parameters	Median (interquartile range) or Mean +/- SD or Number (percentage)
Intra-operative transfusion	23 (0.8%)
Intra-operative complication	138 (12.2%)
Hospital stay (days)	2 (1 – 3)
- 0	596 (16.1%)
- 1	1114 (30.1%)
- 2	953 (25.8%)
- 3	524 (14.2%)
- 4	198 (5.4%)
- 5	115 (3.1%)
- 6-119	195 (5.3%)
Foley catheterization duration (days)	1 (1 – 2)
- 0	99 (3.4%)
- 1	1749 (60.6%)
- 2	602 (20.9%)
- 3	250 (8.7%)
- 4-44	187 (6,5%)
Required re-catheterization	170 (5.9%)
Adenocarcinoma on pathology	17 (1.9%)
30-day readmission	209 (13.2%)

Results – Post-operative Complications (≤30 days)

	Complications	Number of patients (%)
Minor	Fever	63 (4.0%)
	UTI	126 (5.4%)
	LUTS*	522 (22.3%)
	OAB	7 (1.1%)
	Incontinence	244 (10.4%)
	Retention	173 (7.4%)
	Hematuria	232 (9.9%)
Major	Urosepsis	5 (0.8%)
	Osteitis Pubis	1 (0.2%)
	Retrograde ejaculation	35 (4.4%)
	Paraphymosis	1 (0.2%)
	Prostatic capsule perforation	8 (0.5%)
	Postoperative transfusion	21 (1.3%)
	Stenosis (urethra, meatus, bladder neck)	2 (0.1%)
	False passage	1 (0,2%)
	Arrhythmia	6 (0.4%)
	Major cardiac event **	12 (0.8%)
	Respiratory distress (desaturation)	3 (0.2%)
	Death	4 (0.3%)

Results – Functional Outcomes

Outcome	Preoperative	Months						
		3	6	12	24	36	48	60
PSA (ng/mL)	3.11 (1.8-6)	--	1.6 (0.8-3.14)	1.5 (0.7-2.8)	1.7 (0.7-3.7)	1.7 (0.7-3.7)	1.7 (0.7-3.7)	1.4 (0.6-3.6)
% PSA drop		--	44.5 (16.7-67.3)	46.3 (13.7-73.3)	53.5 (20-73.6)	46.3 (16.2-70.4)	47.8 (7.3-70)	46.6 (9.1-67.8)
IPSS	22 (19-27)	6 (4-9)	5 (4-9)	4 (2-7)	4 (3-7)	4 (3-7)	4 (3-7)	5 (3-8)
QoL	4 (3-5)	1 (1-2)	1 (0-2)	1 (0-1)	1 (0-1)	1 (0-1)	1 (0-1)	1 (0-2)
Qmax (mL/s)	6.3 (4-9)	19 (16-22)	18 (15-22)	18 (15-22)	19 (15-23)	18 (15-22)	17 (14-22)	17 (14-21)
PVR (mL)	122 (32-291)	17 (0-50.8)	15 (0-38)	15 (0-40)	10 (0-40)	10 (0-41)	15 (0-50.3)	23.5 (3.5-63.1)
BPH recurrence requiring repeat surgery	**1.5%**							

Limitations

- Retrospective study
- Difficult to account for variation in preoperative medical therapy; use of anticoagulation, alpha blockers, 5α-reductase inhibitors
- Cannot account for differences in skill between surgeons, as well as the different GL-PVP techniques and protocols implemented
- The learning of curve of the surgeon may have impacted early experiences and outcomes of GL-PVP
- Data was collected from large referral centers. Many patients were lost to follow up to be followed in local community settings

Conclusions

- This multi-institutional, multi-user experience demonstrates **global safety**, **efficacy** and **durability** of GL-PVP for the treatment of BPH related LUTS
- Our series demonstrates that GL-PVP achieves median **PSA reduction of 46.3%, 53.5% , and 46.6% at 12, 24, and 60 months**, respectively.
- The majority of post-operative complications comprise of LUTS, incontinence, hematuria, with few major complications such as urethral/bladder neck stenosis (0.1%), major cardiac events (0.8%), and death (0.3%)
- **BPH recurrence requiring surgical repeat surgical intervention was observed at 1.5% at 5 years of followup**
- To the best of our knowledge, this is the largest series of GL XPS cases reported
- Further subgroup analyses are currently being carried out