Comparison of the diagnostic criteria of urodynamic study for Detrusor underactivity in patients with benign prostatic hyperplasia

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INTRODUCTION

- The prevalence of benign prostatic hyperplasia (BPH) increases with age. Detrusor underactivity (DU) is also a more common disease in elderly patients. However, there is no standard diagnostic criteria for DU.
- We applied various diagnostic criteria to evaluate the influence of patient perspectives including satisfaction and the results of Holmium laser enucleation of the prostate (HoLEP) surgery.
- This study would contribute to give an answer to what kind of diagnostic criteria should be adopted for pre-operative evaluation of HoLEP and prediction of prognosis in patients with DU.

METHODS

- From May 2012 to February 2017, total 243 patients who underwent HoLEP. We retrospectively reviewed the med-ical records of patient. Finally 93 patients were enrolled in the study.
- Preoperative evaluation included IPSS, TRUS, uroflowm-etry, and urodynamic study. At postoperative 3 months, IPSS, uroflowmetry, complication of operation.

Definition of DU	
Bladder Contractility Index (BCI)	pdetQmax + 5 Qmax < 100
Abrams-Griffith (AG) number criteria	BOO Index < 20 & Qmax < 12ml/s
pdetQmax 30 criteria	pdetQmax < 30cmH20 & Qmax < 10ml/s
Bladder voiding efficiency (BVE) criteria	BCI < 100 & AG number < 20 & BVE% < 90

BOO index : Bladder outlet obstruction index = pdetQmax -2Qmax

RESULTS

- Of 93 patients, The prevalence of DU based on each criteria was 31.2, 12.9, 11.8, 9.7%. (Bladder contractility index(BCI), Abrams-Griffith (AG) number criteria, maximal detrusor pressure at maximal flow rate (pdetQmax) < 30 criteria, bladder voiding efficiency (BVE) < 90% criteria, respectively)
- Univariate analysis revealed that there was no difference in preoperative factors between patients included in each of the four criteria and each control group. (Table 1)
- Otherwise, there were showed significant differences in BVE<90% criteria for IPSS-voiding score and in AG number criteria for incontinence compared to the control group. (Table 2)

Table 1.Patients demographics and preoperative characteristics

	BCI criteria		P value	AG number criteria		P value	pdetQmax criteria		P value	BVE criteria		P value
	Control (n=64)	DU (n=29)		Control (n=81)	DU (n=12)		Control (n=82)	DU (n=11)		Control (n=84)	DU (n=9)	
Age(y)	69.30±6.82	69.28±8.22	0.990	69.65±7.12	66.83±7.90	0.210	69.43±7.16	68.27±7.93	0.622	69.38±7.19	68.44±8.02	0.714
BMI(kg/m^2)	24.71±2.83	25.81±3.45	0.109	24.77±2.70	26.99±4.55	0.018	24.71±2.70	27.62±4.35	0.003	24.98±3.08	25.77±2.94	0.464
HTN(n, %)			0.34			0.006			0.016			0.089
Yes	15(23.4)	13(44.8)		20(24.7)	8(66.7)		21(25.6)	7(63.6)		23(27.4)	5(55.6)	
No	49(76.6)	16(55.2)		61(75.3)	4(33.3)		61(74.4)	4(36.4)		61(72.6)	4(44.4)	
DM(n, %)			0.329			0.040			0.112			0.55
Yes	13(20.3)	4(13.8)		12(14.8)	5(41.7)		13(15.9)	4(36.4)		13(15.5)	4(44.4)	
No	51(79.7)	25(86.2)		69(85.2)	7(58.3)		69(84.1)	7(63.6)		71(84.5)	5(55.6)	
CVA(n, %)			0.499			0.015			0.105			0.406
Yes	3(4.7)	2(6.9)		2(2.5)	3(25.0)		3(3.7)	2(18.2)		4(4.8)	1(11.1)	
No	61(95.3)	27(93.1)		79(97.5)	9(75.0)		79(96.3)	9(81.8)		80(95.2)	8(88.9)	
Pre-IPSS-V	12.59±5.66	14.38±4.86	0.145	13.32±5.53	12.00±5.08	0.437	13.41±5.48	11.18±5.17	0.205	13.44±5.50	10.44±4.50	0.118
Pre-IPSS-S	8.67±3.49	9.97±4.29	0.127	8.94±3.79	10.00±3.77	0.367	8.88±3.78	10.55±3.59	0.171	8.90±3.72	10.67±4.15	0.185
Pre-IPSS-Q	4.14±1.30	4.59±1.02	0.105	4.23±1.26	4.58±1.00	0.361	4.24±1.25	4.55±1.04	0.447	4.26±1.25	4.44±1.01	0.674
Pre-IPSS-T	21.27±8.27	24.34±7.48	0.090	22.26±8.33	22.00±6.84	0.918	22.29±8.28	21.73±7.10	0.830	22.34±8.22	21.11±7.46	0.667
Pre-Qmax	8.44±4.57	6.07±1.94	0.009	7.80±4.28	7.00±2.37	0.528	7.89±4.26	6.27±2.01	0.219	7.79±4.25	6.89±1.83	0.534
Pre-VV	173.20±113.47	141.69±83.22	0.184	165.57±109.72	148.58±73.09	0.606	166.54±109.73	139.82±65.24	0.433	165.73±109.16	141.44±62.37	0.515
Pre-PVR	98.84±101.01	102.34±95.28	0.875	99.78±97.70	101.00±110.16	0.968	98.73±97.82	108.91±110.07	0.750	96.33±97.60	133.56±109.13	0.285

BCI : Bladder contractility index, AG : Abrams-Griffith, BVE : bladder voiding efficiency, DU : Detrusor underactivity, BMI : Body mass index, HTN : Hypertension, DM : Diabetes mellitus, CVA : Cerebrovascular accident, IPSS-V :International Prostate Symptom Score voiding sub-score, IPSS-S : IPSS storage sub-score, IPSS-Q : IPSS quality of life sub-score, IPSS-T : IPSS total score, VV : voiding volume, PVR : post-void residual volume

Table 2.Comparison of post-operative variables

	BCI criteria		P value	AG number criteria		P value	pdetQmax criteria		P value	BVE criteria		P value
	Control (n=64)	DU (n=29)		Control (n=81)	DU (n=12)		Control (n=82)	DU (n=11)		Control (n=84)	DU (n=9)	
ΔIPSS-V	9.72±6.61	9.86±5.99	0.921	10.22±6.26	6.67±6.69	0.072	10.17±6.30	6.73±6.57	0.093	10.27±6.20	5.00±6.54	0.018
ΔIPSS-S	3.77±4.25	4.24±4.19	0.617	3.89±4.27	1.08±3.99	0.882	3.80±4.26	4.73±4.00	0.499	3.92±4.22	3.89±4.49	0.985
ΔIPSS-Q	2.14±1.58	2.41±1.48	0.433	2.23±1.54	2.17±1.64	0.888	2.22±1.54	2.27±1.68	0.915	2.25±1.55	2.00±1.58	0.648
ΔIPSS-T	13.08±9.06	14.10±8.62	0.609	13.79±8.70	10.75±10.06	0.271	13.66±8.76	11.45±10.03	0.443	13.88±8.62	8.89±10.60	0.110
Qmax Imp (%)			0.484			0.421			0.360			0.238
Yes	51(79.7)	24(82.8)		66(81.5)	9(75.0)		67(81.7)	8(72.7)		69(82.1)	6(66.7)	
No	13(20.3)	5(17.2)		15(18.5)	3(25.0)		15(18.3)	3(17.3)		15(17.9)	3(33.3)	
Post-PVR	18.2±34.7	13.5±27.8	0.524	17.6±34.0	10.6±21.5	0.489	17.4±33.8	11.6±22.3	0.579	17.1±33.5	12.9±24.5	0.714

BCI :Bladder contractility index, AG : Abrams-Griffith, BVE : bladder voiding efficiency, DU : Detrusor underactivity,ΔIPSS : Interval change between preoperative and post-operative International Prostate Symptom Score. IPSS, IPSS-V : IPSS voiding sub-score, IPSS-S : IPSS storage sub-score, IPSS-Q : IPSS quality of life sub-score, IPSS-T : IPSS total score, Imp : Improvement. Post-PVR : post operative post-void residual volume

CONCLUSIONS

- Our results seem that BVE<90% criteria were superior to other criteria in distinguishing the subjective outcome after HoLEP.
- Also, AG number criteria will help predict incontinence incidence. It will be helpful to explain the postoperative prognosis to the patient before operation, using the proper diagnosis criteria.