Does similarity between patterns of detrusor overactivity and detrusor pressure during voiding affect postoperative outcomes in benign prostatic hyperplasia?

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BACKGROUND

Benign prostatic hyperplasia (BPH) is a common condition in aging males which often causes bladder outlet obstruction (BOO) with negative impact on male lower urinary tract symptoms. Preoperative urodynamic study (UDS) is not mandatory for BPH surgery, but it is commonly utilized to evaluate the degree of obstruction (bladder outlet obstruction index; BOOI) and detrusor contractility (bladder contractility index; BCI), and predict surgical outcomes. Both indexes use detrusor pressure at maximal flow rate (PdetQmax) and maximal flow rate (Qmax) during voiding cystometry. To minimize the artifact and errors, voiding pressures should be analyzed when the patient is sufficiently relaxed and involuntary bladder contraction should not be used for calculating the pressure-flow relationship. However, there are some patients who present similar patterns between DO and detrusor pressure (Pdet) during voiding despite repeated measurement.

HYPOTHESIS/AIM OF STUDY

Our hypothesis is that patients who present similar patterns between DO and Pdet during voiding might depend on DO or urge to void (although their uninhibited urge to void is denied during pressure-flow study) so the real Pdet of such patients could be overestimated. Thus, those patients might present different clinical characteristics and surgical outcomes after BPH surgery. The aim of present study was to investigate whether similar patterns of DO and Pdet during voiding on preoperative urodynamic study would affect clinical outcomes after HoLEP in BPH patients

METHODS

The institutional review board of the center approved the study (IRB No. 2020-1478) for reviewing the electronic medical records. Informed consent was waived due to the retrospective study design.

Among BPH patients who underwent HoLEP between 2009 and 2020, those with positive DO preoperative UDS were included. Any patients with genitourinary malignancy, neurogenic bladder, or urethral stricture were excluded.

DO patterns were compared with patterns of Pdet during voiding. Group A presented similar patterns (shape and amplitude) between DO and Pdet during voiding (Figure 1), while Group B presented different patterns.
Perioperative parameters were compared between Group A and Group B. Subgroup analysis was based on presence of detrusor underactivity (DU; bladder contractility index (BCI) < 100).

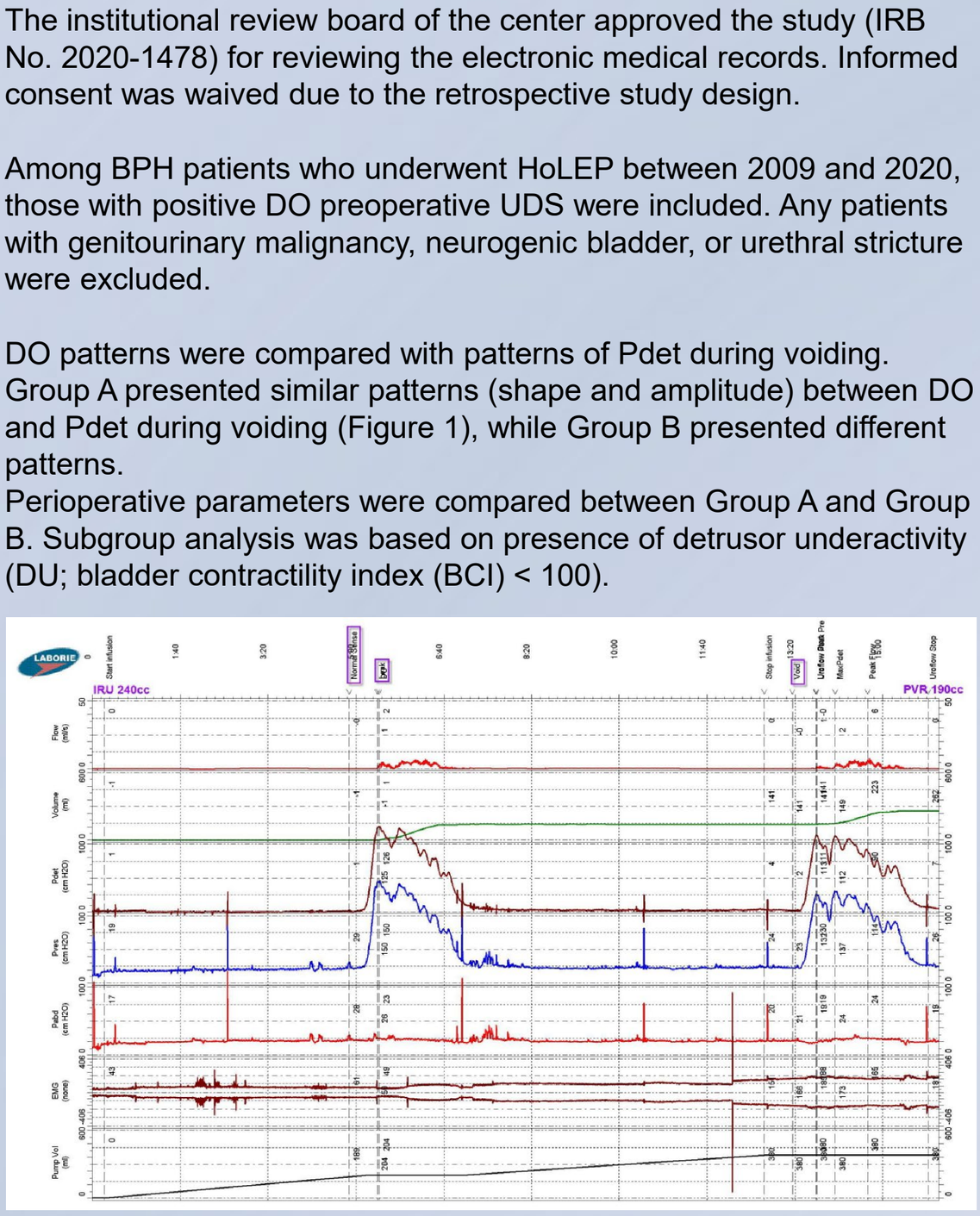


Figure 1. Representative filling and voiding cystometry

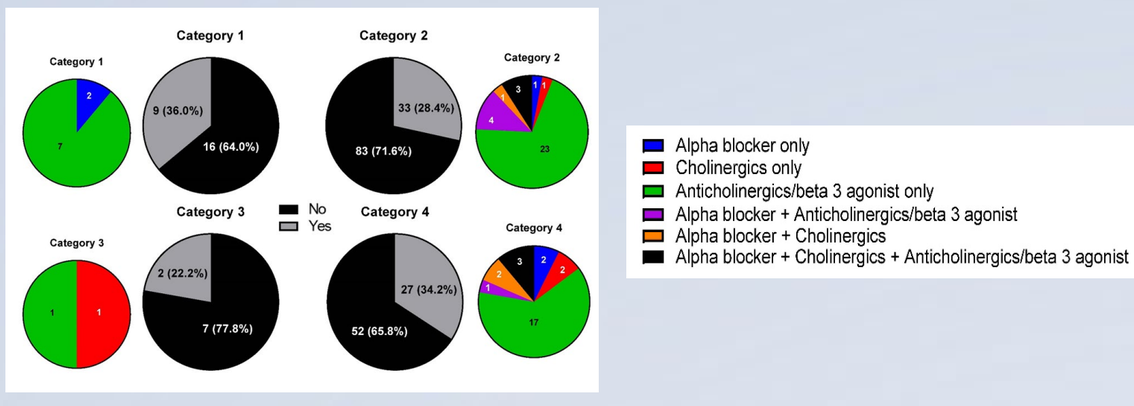
RESULTS

Baseline demographics of patients
A total of 256 patients were included with mean age of 69.7 ± 6.3 years with median follow-up of 49.2 (range: 1.2 – 259.2) months. Based on DO patterns, 34 patients were assigned to Group A (similarity patterns between DO and Pdet during voiding) and others (n=222) were categorized into Group B. There were no significant differences in age, underlying diseases and preoperative prostate volume on TRUS. However, Group A was less exposed to BPH medication before surgery and acute urinary retention was more frequent (41.2% vs. 24.8%, p = 0.045) than Group B. Meanwhile, there were no differences in duration and types of medication in those who patients were under medical therapy.

Preoperative voiding profiles and urodynamic parameters
There were no differences in mean episodes of daily frequency, urgency and urgency urinary incontinence between groups. IPSS total score (mean: 21.6 ± 10.9) did not differ (22.9 ± 8.3 vs. 21.3 ± 11.3, p =0.248). IPSS QoL (quality of life) score was higher in Group A (4.6 ± 1.2 vs. 4.0 ± 1.3, p = 0.037).
Patients in Group A had smaller voided volume in both uroflowmetry and voiding cystometry. First sensation and detrusor overactivity was observed in smaller volume, but maximum amplitude of DO was higher. All patients in Group A succeeded in voiding at voiding cystometry with larger MaxPdet (maxium detrusor pressure) and PdetQmax. Both groups presented mean BOOI (PdetQmas – 2 * Qmax) larger than 40, but BOOI was higher in Group A. Smaller proportion of patients had DU defined as BCI (PdetQmax + 5 * Qmax) less than 100 but not statistically significant (26.5% vs. 40.5%, p = 0.120).

Postoperative changes in voiding after BOO surgery
Effects of BOO surgery were additionally assessed after dividing patients in to four categories (1. DUA (-) Group A; 2. DUA (-), Group B; 3. DUA (+) Group A; 4. DUA (+) Group B). On postoperative 1 month and 6-month uroflowmetry/bladder scan, voided volume, Qmax and post-void residual volume were significantly improved except for patients in category 3; DUA (+) Group A (Table 1).
In addition, there were no differences in proportions and types of postoperatively prescribed medication among four groups. (Figure 2)

	Preoperative	Post-1mo	Post-6mo	p-value[1]	p-value[2]
Overall					
Voided volume	125.9 ± 94.3	193.3 ± 118.2	194.4 ± 12.80	< 0.001	< 0.001
Qmax	7.5 ± 8.5	17.6 ± 8.5	18.0 ± 10.2	< 0.001	< 0.001
Postvoid residual	124.4 ± 130.0	39.5 ± 52.6	23.3 ± 34.5	< 0.001	< 0.001
Category 1: DUA (-), Group A					
Voided volume	82.0 ± 39.8	161.9 ± 76.4	158.9 ± 66.4	0.001	0.007
Qmax	5.8 ± 3.0	18.0 ± 10.0	17.8 ± 7.4	< 0.001	0.003
Postvoid residual	123.2 ± 131.2	49.3 ± 32.2	51.3 ± 54.9	0.004	0.021
Category 2: DUA (-), Group B					
Voided volume	146.4 ± 99.2	205.9 ± 116.4	205.9 ± 134.7	< 0.001	0.001
Qmax	8.1 ± 4.4	20.4 ± 8.1	19.9 ± 9.7	< 0.001	< 0.001
Postvoid residual	113.7 ± 124.0	35.2 ± 34.5	17.1 ± 23.1	< 0.001	< 0.001
Categroy 3: DUA (+), Group A					
Voided volume	88.4 ± 44.7	85.9 ± 75.5	111.3 ± 67.5	0.515	0.398
Qmax	18.0 ± 38.3	10.6 ± 5.5	16.6 ± 10.4	0.326	0.237
Postvoid residual	58.2 ± 64.5	30.6 ± 39.1	21.0 ± 28.7	0.483	0.075
Category 4: DUA (+), Group B					
Voided volume	138.6 ± 91.7	201.6 ± 131.4	210.0 ± 144.4	< 0.001	0.002
Qmax	7.3 ± 4.3	15.1 ± 7.5	16.6 ± 11.1	< 0.001	< 0.001
Postvoid residual	96.6 ± 92.2	32.5 ± 40.1	23.8 ± 40.2	< 0.001	< 0.001



CONCLUSIONS

Voiding pressures should be analyzed during the voluntary portion of voiding when the patient is relaxed. When the bladder capacity is reached, the subject is asked to relax and void as normally as possible. And a pressure flow voiding study is obtained. If a patient is unable to void for a study, this does not mean that the patient has acontractile bladder or DU. The only conclusion that can be definitively made in such cases is that the patient was unable to void for the study. The pressure flow relationship should be observed over the voluntary portion of voiding. In patients with DO, the unstable contraction can reach high pressures as the patient attempts to inhibit it. At the first DO, it should be ascertained whether or not the patient was aware of the contraction, whether or not he was concerned, and whether or not he perceived it as an urge or as pain. The bladder should be refilled, and the patient should be instructed to try to abort the involuntary contraction, should it occur again during filling.
Despite retrospective study design and short-term follow-up, there were some differences between BPH patients with or without similar patterns between preoperative DO and Pdet during voiding. Those with similar patterns were more naïve to medical therapy with more episodes of urinary retention and smaller maximal cystometric capacity. In addition, the therapeutic effects of HoLEP was limited in such patients who had concurrent DU.

REFERENCES

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