

Article

Association Between Bladder Detrusor Weight and Uroflowmetry Parameters

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Abstract: The purpose of this study was to evaluate the association between bladder detrusor weight (BDW) and uroflowmetry parameters: maximum flow rate and voided volume in patients with lower urinary tract symptoms. This study proposes, through non-invasive ultrasound measurement of detrusor thickness and calculation of detrusor weight, to identify how compensatory detrusor hypertrophy impacts urine flow efficiency. The results show that BDW is strongly related to reduced values, indicating its value as a clinical marker for BOO. Combining BDW measurements with conventional uroflowmetry yields a holistic diagnostic assessment of bladder wall morphological content and voiding dysfunction that represents an alternative non-invasive substitute for complex invasive urodynamic studies.

Keywords: Benign prostatic hyperplasia, bladder detrusor weight, uroflowmetry, maximum urine flow rate (Q_{max}), average urine flow rate (Q_{av}), time to reach maximum flow rate (tQ_{max}).

Introduction

Benign prostatic hyperplasia (BPH) may lead to infravesical obstruction and has a significant effect on bladder reposition [1]. As a result, detrusor muscle hypertrophy occurs due to increased mass [2]; Uroflowmetry is the most perfect objective device used to show urinary flow dynamics in which the parameters Q_{max}-maximum flow rate, Q_{av}-average flow rate, tQ_{max}-time required reaching maximum flow rate are considered [3, 4].

Objective: The present study aimed to elucidate the correlation between bladder detrusor weight and uroflowmetry parameters (Q_{max}, Q_{av}, tQ_{max}) in diagnosing benign prostatic hyperplasia (BPH) [5,6].

Materials and Methods

This was a single center prospective study carried out among 126 clinically diagnosed patients of BPH who had completed preoperative workup. Uroflowmetry was performed on all patients,

tQ_{max} readings obtained with Q_{max}, Q_{av}. Detrusor weight was calculated based on geometric formulas from the total and inner bladder radii (exact formulas are available in 1: main text of thesis).

Results

The mean age of patients was 67.3 ± 8.2 years. The preoperative uroflowmetry parameters were [7, 8]:

- Qmax: 9.2 ± 3.4 ml/sec
- Qav: 5.8 ± 2.1 ml/sec
- tQmax: 8.5 ± 3.1 sec
- Average weight of bladder detrusor: 35.7 ± 15.4 g

The correlation analysis showed a correlation with [9]:

- A strong inverse association between the weight of the bladder detrusor and maximum flow rate ($r = -0.58$, $p < 0.001$).
- Detrusor bladder weight was an inverse strongly significant correlate of Qav ($r = -0.55$, $p < 0.001$) [10, 11].
- Bladder detrusor weight had a strong positive correlation with tQmax but an even stronger correlation was noted with bladder detrusor weight ($r = 0.49$, $p < 0.001$) [12, 13].

Our results show that there is an apparent link between increased bladder detrusor weight leading to reduced maximum & average flow rates, and a delayed time to peak flow rate [14]. This represents the natural evolution of infravesical obstruction and compensatory detrusor hypertrophy [15].

Conclusion

For BPH patients, bladder voiding pressure (detrusor weight) strongly correlates with urodynamic parameters (Qmax, Qav, tQmax). Bladder detrusor weight combined with uroflowmetry parameters plays a crucial role in the evaluation of the bladder-voiding function and help to analyze disease progression and treatment response in patients who have benign prostatic hyperplasia.

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