

EFFECTS OF INCREASED FILLING RATE (FAST FILL CYSTOMETRY) ON OUTLET RESISTANCE AND BLADDER CONTRACTILITY PARAMETERS DURING PRESSURE-FLOW STUDIES

Hypothesis / aims of study

Urinary flow rate estimations and pressure-flow (P-Q) studies are often recommended in the decision-making process in the management of patients with lower urinary tract symptoms (LUTS). While low rates of bladder filling are preferred for generating physiologically relevant cystometry during P-Q studies, it is not clear whether these studies performed at high intravesical infusion rates affect P-Q parameters. Anecdotally, patients exposed to rapid diuresis often describe hesitancy and decreased flow rates compared to their usual voiding patterns with normal fluid intake. To evaluate if any change in detrusor contractility, bladder outlet obstruction index, opening time, and post-void residual (PVR) occurs with varying filling rates during P-Q studies, we conducted P-Q studies in adult men using slow and fast rates of bladder filling.

Study design, materials and methods

We conducted pressure-flow (P-Q) studies on adult men with LUTS in the standing position after performing a fluoroscopy-assisted filling cystometrogram and voiding cystourethrogram using dilute radio-contrast solution. Patients with spinal cord injuries, multiple sclerosis, and Parkinson's disease were excluded from the study. During the first pressure-flow evaluation, sterile normal saline solution was instilled into the bladder at a rate of 25 ml/minute via a 6F or 7F transurethral catheter until the patient had a strong desire to void. After voiding, the study was then repeated using the same catheter at a fast instillation rate of 100 ml/minute until the patient had a strong desire to void. Differences in pressure-flow parameters, including detrusor contractility, index of bladder obstruction, opening time and post-void residual, were evaluated using paired t-tests.

Results

A total of twelve male patients underwent repeated PQ studies using slow and fast filling rates. The patients ranged from 54 to 85 years of age. Of the twelve patients, seven patients exhibited decreased detrusor contractility during fast filling rate based on Watt's Factor (WF) number, while four patients showed increased contractility and one patient had no change in contractility. However, the overall change in contractility was not statistically significant. Based on the ICS nomogram for classification of BOOI, nine patients demonstrated no change in classification, one patient improved from obstructed to equivocal, one patient worsened from equivocal to obstructed, and one patient transferred from no obstruction to equivocal after retesting. Opening time, the time between the onset of detrusor contraction and the start of detectable urine flow, increased during the fast filling in three of twelve patients, ranging from 2.1-20 seconds but was not statistically significant. Figure 1 represents the percentage change between each P-Q parameter evaluated during slow and fast filling rates. The post-void residual volume was elevated after second instillation in ten of twelve patients and ranged from 10-248 ml. Four patients had PVR of greater than 100 ml, ranging 108-248 ml; three of these patients had decreased detrusor contractility, with percent decrease in WF ranging between 43-56%, and one patient had an increase in WF by 62%.

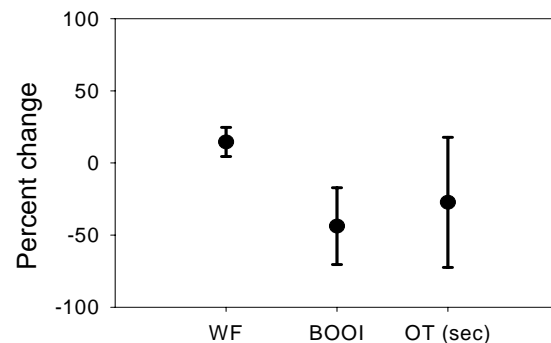


FIGURE 1. Percentage change within pressure flow parameters between slow and fast filling rates. WF = Watt's factor; BOOI = Bladder outlet obstruction index; OT (sec) = Opening time in seconds.

Interpretation of results

We found no statistically significant evidence of worsening detrusor contractility, BOOI, opening time, or PVR in these study patients with slow and fast filling. Previous studies have shown no conclusive evidence of the effect of varying filling rates on detrusor pressure or capacity[1]. While other studies have examined test-retest reproducibility of BOOI and detrusor contractility using a standard instillation rate, to our knowledge, this is the first study to examine pressure-flow parameters with slow and fast filling rates, the latter probably representing rapid diuresis.

Concluding message

We found that outlet resistance parameters were not significantly affected by increasing the rate of bladder instillation. Further study with a larger number of patients with varying types of voiding dysfunction, degrees of outlet obstruction, and detrusor contractility is warranted to assess if bladder outlet obstruction or bladder contractility are affected with increased instillation rates.

References

1. Pharmacological studies of the uninhibited neurogenic bladder. The influence of repeated filling and various filling rates on the cystometrogram of neurological patients with normal and uninhibited neurogenic bladder. *Acta Neurol Scand*, **64**(3):145-174, 1981.

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