

INFLUENCE OF THE BLADDER FILLING SPEED OVER THE VOIDING PHASE IN THE PRESSURE FLOW STUDY IN THE WOMAN

Hypothesis / aims of study

Differences between the uroflow values recorded with uroflowmetry (UFM) free to those ones obtained with pressure flow studies (PFS), are frequently reported in literature. However the causes aren't simply attributed to the only mechanic increase of the resistances to the urinary flow induced by trans-urethral catheter, because such differences have been found also with the utilization of a suprapubic catheter (1). Even the maximum flow (Q_{max}) with PFS presents different values if it is done with conventional urodynamic studies (UDS) or with ambulatory urodynamic studies. Besides an addition of a possible psychogenic inhibition of the patient, other more complex physiological reasons must be found out, because the fast filling used in the clinical studies takes to some alterations of the force of detrusor contraction. Studies in vitro on strips of bladder smooth muscle of a mouse have proved that the duration of the stretching interferes on the mechanic activity of the muscle (2), while tonicity and the capacity of adaptation are connected with the physical properties of the bladder wall and they don't depend on neural activity (3). This study wants to put in evidence a relationship between the speed with which the bladder is filled and the following urine flow during the performing of pressure flow studies on a women population.

Study design, materials and methods

Seventy women were recruited from neurologically normal patients referred for UDS and were undergone, upon informed consent, a double PFS done with two different filling speeds, at 20 ml/min and at 50 ml/min. The patients had a mean age of 53.96 years (± 12.61 SD, range 32 to 77 years), a pelvic organ prolapse (POP) of stage not above a second, a normal detrusor function, and a normal urethral closure mechanism. The studies have been done while sitting with a transurethral catheter double lumen of 8 Fr and filling saline at 37°C. The two pressure flow studies have been done on every patient with a gap of 30 minutes and with a random course and variable from patient to patient.

The data have been analysed using the test t-Students for paired samples with two tails. The significant level chosen is for $p < 0.05$. We have used the test of Persons to study the correlation between the Q_{max} and the average flow (Q_{ave}) at the two different speeds of filling. Methods, definitions and units conform to the standards recommended by the International Continence Society, except where specifically noted.

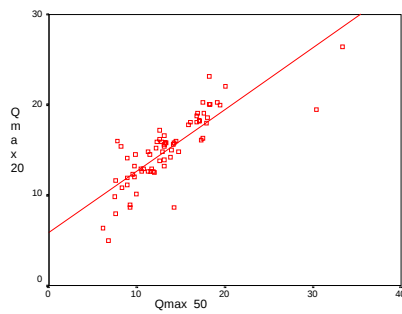
Results

Table demonstrates the results obtained along with the p values.

	Mean $\pm$ S.D.		p	Pearsons
	20 ml/min	50 ml/min		
Q _{max}	15.06 $\pm$ 3.90 ml/sec	13.50 $\pm$ 4.75 ml/sec	0.000	0.825
Q _{ave}	9.32 $\pm$ 2.95 ml/sec	8.38 $\pm$ 3.32 ml/sec	0.001	0.733
P _{det} /Q _{max}	21.41 $\pm$ 12.26 cm/H ₂ O	20.62 $\pm$ 12.44cm/H ₂ O	0.08	nil
PVR	10.72 $\pm$ 16.22 ml	11.23 $\pm$ 15.61 ml	0.06	nil

Table

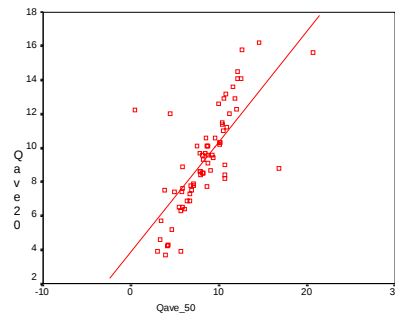
The values of Q_{max} obtained after bladder filling at 20 and at 50 ml/min are visualized, with relative curve of tendency, in the graphic one; while the corresponding Q_{ave} values are visualized in graphic 2.



GRAPH 1

Interpretation of results

Both the rate of max flow and the rate of average flow have been much higher when they come after a bladder filling carried out at 20ml/min in comparison with the ones obtained after a faster filling at 50ml/min. These differences were statistically significant ($p < 0.05$). Even Pearson's test presents statistically significant correlation (0.825 and 0.733) comparing both Qmax and Qave with bladder filling at 20 and 50 ml/min. There was no statistical difference between the values of Pdet/Qmax obtained after the two bladder filling. The reduced PVR that we have found indicates that all these patients have a detrusor with a normal contractile force and a suitable force for a physiological voiding. The increase of the flow after a slow filling could be caused by a longer duration of the stretching on the bladder wall with an increase of the contractile power of the detrusor.



GRAPH 2

Concluding message

This study proves that the speed by which the bladder is filled influences the urinary flow; therefore when we carry out a pressure flow study on a woman we must consider the speed we fill the bladder, with a correct interpretation of results. It would be hoped the realization of multicentric studies to standardize more the procedures for carrying out a PFS.

References

- 1) Good Urodynamic Practices: Uroflowmetry, Filling Cystometry, and Pressure-Flow Studies. Neurourology and Urodynamics 21:268-269 (2002)
- 2) Comparison of long-term and short-term stretch on rat urinary bladder in vitro. Urol Res. 1988; 16(4):277-80
- 3) In vitro responses of detrusor smooth muscle to stretch and relaxation. Scand J Urol Nephrol Suppl. 1999; 201:5-11