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IS DETRUSOR HYPERTROPHY IN WOMEN ASSOCIATED WITH SYMPTOMS AND SIGNS OF VOIDING DYSFUNCTION?

Hypothesis / aims of study

In males, detrusor hypertrophy is known to be associated with bladder outlet obstruction, with an increase in pressures at maximum flow clearly related to an increase in urethral resistance[1]. In men, bladder wall thickness ≥5mm appears to be a useful predictor of outlet obstruction with a diagnostic value exceeding that of free uroflowmetry indices[2]. There is currently no data in the literature examining whether this may also apply in the female. The aim of this study was to determine whether detrusor hypertrophy in women is associated with evidence of obstructed voiding on free flowmetry and pressure- flow studies.

Study design, materials and methods

The records of 792 women with lower urinary tract symptoms who had attended a tertiary Urogynaecological unit from November 2002 to January 2006 were examined retrospectively. Symptoms of hesitancy, poor stream and stop-start voiding were recorded as screening symptoms for voiding dysfunction. Free uroflowmetry was obtained using a weight transducer type flowmetry system, with patients voiding in a private setting. Maximum flow rate centiles (MFR centiles) were calculated by using the Liverpool nomogram equation. All women had undergone full multichannel urodynamic testing using a fluid-filled system. Pressure- flow data were recorded as maximum flow rate (Qmax) and detrusor pressure at maximum flow (Pdet Qmax). The different methods of analyzing pressure/flow plots to quantify bladder outlet resistance in men such as the urethral resistance factor (URA, Griffiths) and the obstruction coefficient (OCO, Schaefer) were used and calculated using the following equations:

$$URA = [(1+1.52.10^{-3}*Qmax^2*Pdet)^{1/2} - 1] / (7.6.10^{-4} * Qmax^2)$$
$$OCO = Pdet / (40+2*Qmax)$$

After catheter removal with the patient supine, transperineal ultrasound of the urinary bladder was performed using 8-4 mHz curved array transducers. In 686 cases, datatsets were complete, with DWT determined at bladder filling of <=50 ml. Statistical analysis was done by using statistical software (SPSS 13.0 for Windows, SPSS Inc., Chicago, Illinois, USA). The following analyses relate to those 686 women.

Results

Of the 686 women at an average age of 53.7±13.6 years, 227(33.1%) had symptoms of voiding dysfunction. Table 1 shows that DWT in symptomatic women was lower (4.0 ± 1.4) than in the asymptomatic group (4.3 ± 1.8), (P=0.02).. Free flowmetry indices were associated with symptoms, as were instrumented Qmax (P=0.002) and and detrusor pressure at maximum flow (P= 0.05). There also were significant associations between symptoms and pressure flow data expressed as URA (P= 0.003) and OCO (P= 0.0005), with values generally much lower than in men.

On using published criteria for diagnosing voiding dysfunction on the basis of free uroflowmetry and residual urine (MFR <10th centile of the Liverpool Nomogram and/or a residual urine volume over 30 mL)[3], voiding difficulty was diagnosed in 33% of 227 women who described symptoms of voiding dysfunction (odds ratio = 2.3, 95%CI = 1.6-3.3). Table 2 demonstrates that detrusor wall thickness was not correlated with any parameter describing voiding dysfunction on the basis of either free uroflowmetry or pressure- flow studies.

	Symptoms of voiding dysfunction		
	yes (mean +/- SD)	no (mean +/- SD)	P value
DWT	4.0 +/- 1.4	4.3 +/- 1.8	0.02
Uroflowmetry:			
Qmax	20.8 +/- 14.3	23.8 +/- 14.5	0.01
MFR Centile	28.9 +/- 29.3	33.1 +/- 29.3	0.06
Pressure Flow Studies:			
Qmax	23.6 +/-12.3	26.9 +/- 11.5	0.002
Pdet.Qmax	29.4 +/-12.7	31.8 +/- 14.2	0.05
URA	11.6 +/- 7.5	9.5 +/- 4.9	0.0005
OCO	0.39 +/- 0.23	0.33 +/- 0.18	0.003

Table 1: Associations between symptoms of voiding dysfunction, DWT and voiding parameters.

	Correlation Coefficient	P value
Qmax (uroflowmetry)	-0.045	0.15
MFR Centile	0.057	0.18
Qmax (instrumented)	0.075	0.07
Pdet.Qmax	0.034	0.42
URA	-0.034	0.42
OCO	0.001	0.97

Table 2: Correlation analysis (Spearman test) between DWT and voiding parameters.

Interpretation of results

In agreement with published data, this study confirmed an association between symptoms of voiding difficulty (hesitancy, poor stream and stop – start voiding) and measures of objective voiding dysfunction. However, there was no statistically significant relationship between DWT and any of the parameters commonly used to analyze free uroflowmetry or pressure/flow data for objective evidence of voiding dysfunction or urethral resistance. Detrusor wall thickness was in fact slightly lower in symptomatic women. These observations support the hypothesis that abnormal voiding in females is more likely to be due to to reduced detrusor contractility, rather than outflow obstruction.

Contrary to the situation in men, detrusor hypertrophy in women does not seem to be associated with symptoms or signs of voiding dysfunction. It is speculated that a training effect on the detrusor in women is more likely to arise from isometric contractions against a voluntarily closed outlet (i.e., detrusor overactivity) rather than from isotonic contractions against an outlet that demonstrates increased resistance during normal emptying, i.e., obstructed voiding.

Concluding message

Detrusor hypertrophy in women does not seem to be associated with evidence of obstructed voiding and urethral resistance on free flowmetry and pressure- flow studies. The measurement of DWT can not be used as a predictor of voiding difficulty in women.

References

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