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Rosier P[1]
1. *Department of Urology University Medical Centre Utrecht*

VOIDING INITIAL OPENING PRESSURE, FLOW ACCELERATION AND MEAN CONTRACTION VELOCITY DURING VOIDING. WHAT DO THEY TELL US ABOUT DETRUSOR CONTRACTILITY?

Hypothesis / aims of study

Analysis of detrusor voiding contraction derives increasing attention. A recent publication introduces a derivate of pre-voiding isovolumic pressure increase as a proxy for detrusor (voiding contraction or) contractility. In a small series of urodynamic (pressure flow) tests was shown that 'velocity of initial pressure rise' (dP/dT before flow) had been an indicator for detrusor contractility independent from gender. There is however a paucity of data regarding (pre-voiding) opening detrusor pressure, flow acceleration (before Q_{max}) and contraction velocity during the voiding. We present clinical epidemiological data to unravel how these parameters relate to gender and to detrusor maximum work during voiding and to outflow conditions.

Study design, materials and methods

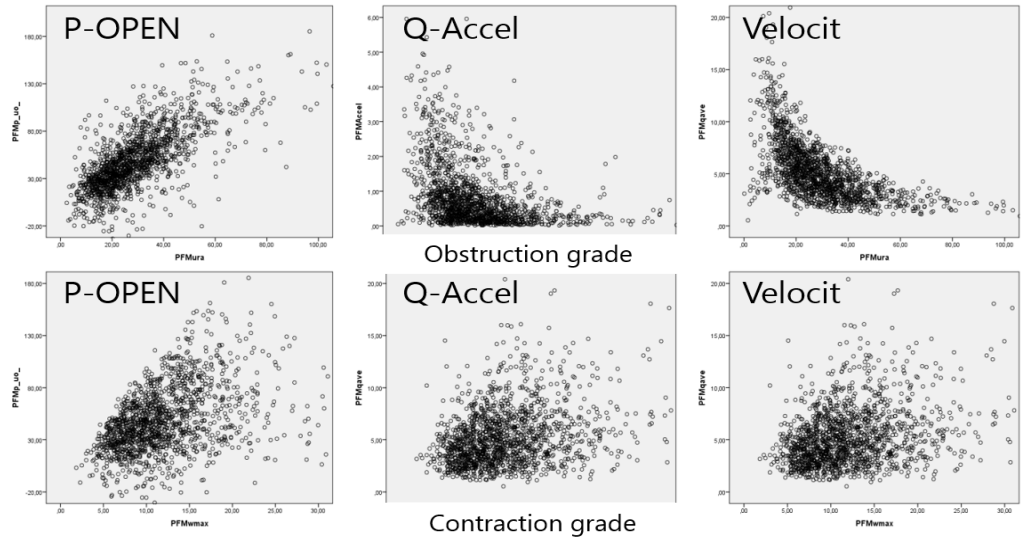
A database with 2180 pressure flow studies (all>45years; 620 women & 1560 men) performed in (men in) preferred position after cystometry until strong (but not extreme) desire to void, was analysed. All voiding volumes were >100mL. Detrusor pressure at the start of flow (P-Open -cmH_2O) flow acceleration to Q_{max} (Accel -mL/s^2) and mean (total-) voiding detrusor shortening (contraction) velocity, based on mean flowrate, (Velocit mL/s) were tested for correlation, and also with W_{max} (maximum contraction work during voiding) and URA (bladder outlet resistance). Results are given for men and women. Scatter-dot-graphs are presented to show associations between the parameters.

Results

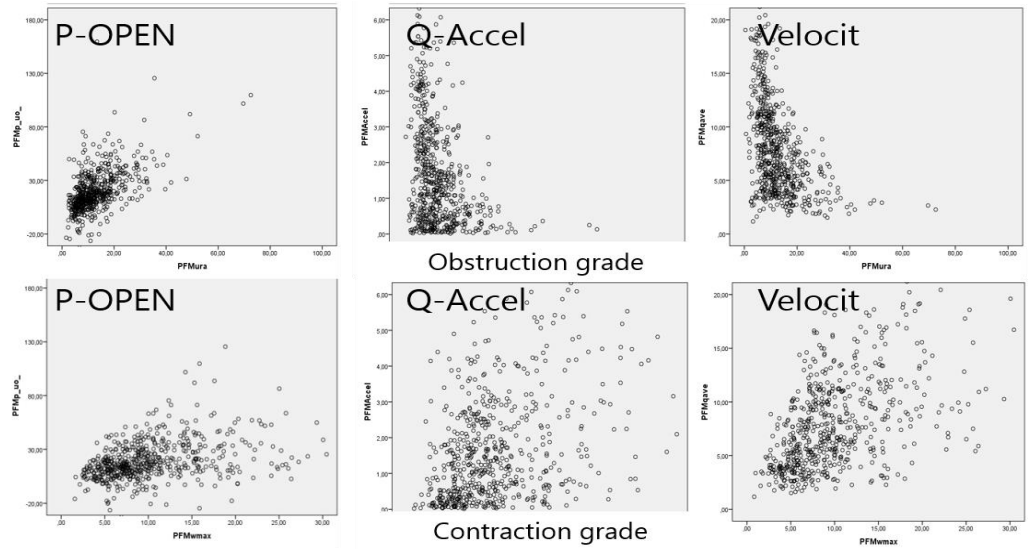
WOMEN		Q-Accel	Velocit	Wmax	URA	BVE
P-Open	P	-,002	-,004	-,007	,250	-,016
	p	,968	,920	,867	,000	,690
	N	599	599	599	599	599
Q-Accel	P		,344	,026	-,128	-,021
	p		,000	,520	,001	,601
	N		617	617	617	617
Velocit	P			,262	-,452	,209
	p			,000	,000	,000
	N			617	617	617
Wmax	P				,027	,169
	p				,496	,000
	N				617	617
URA	P					-,122
	p					,002
	N					617

MEN		Q-Accel	Velocit	Wmax	URA	BVE
P-Open	P	-,050	-,171	,135	,351	-,005
	p	,051	,000	,000	,000	,859
	N	1544	1544	1543	1544	1543
Q-Accel	P		,090	,037	-,134	-,004
	p		,000	,148	,000	,872
	N		1558	1556	1555	1557
Velocit	P			,324	-,584	,004
	p			,000	,000	,863
	N			1556	1555	1557
Wmax	P				,053	,013
	p				,038	,606
	N				1554	1555
PFMura	P					-,014
	p					,589
	N					1554

MEN



WOMEN



The scatter-graphs show (Y-axis) P-Open, Q-accel and Velocit for men and women compared with URA (horizontal top 3x) and W_{max} (horizontal lower 3x):
Note: all scales are identical.

Interpretation of results

More men have higher grade of obstruction; higher opening pressures, slower acceleration to maximum flowrate and slower contraction velocity. Women (of identical age range) have lower opening pressures, faster acceleration and faster voiding detrusor contraction velocity. Flowrate acceleration and voiding contraction velocity appear lesser related to contractility maximum (W_{max}) in women than in men.
The lifelong training of the detrusor against higher outlet resistance causes higher power slower detrusor voiding contraction in men. Gender specific parameters are not needed. At any grade of outlet obstruction (and any grade of compensation of detrusor contraction power for the outlet resistance) contraction can be relatively less forceful (or less persistent) and result in ineffective slow voiding.

Concluding message

Bladder outflow resistance challenges the detrusor muscle during voiding. Opening pressure (at the start of voiding), acceleration to Q_{max} and (mean) detrusor muscle voiding contraction velocity (emptying velocity) are all related to bladder outlet resistance and reflected in maximum contractility, without fundamental (systematic) differences between women and men.

References

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Disclosures
Funding: none **Clinical Trial:** No **Subjects:** NONE