

EPIDEMIOLOGY OF AGEING AND DETRUSOR CONTRACTION ACTIVITY.

Hypothesis / aims of study

Ageing is associated with (striated) muscle wasting and decline in muscle contractility or contraction function. Ageing may also affect the detrusor muscle. Many reports suggest that one of the causes of the increasing prevalence of lower urinary tract (LUT) dysfunction in the elderly may be caused by detrusor underactivity (DU). Although DU is a urodynamic diagnosis the ICS definition limits to a qualitative description: '... a contraction of reduced strength and/or duration, resulting in prolonged bladder emptying and/or failure to achieve complete bladder emptying in a normal time span.'

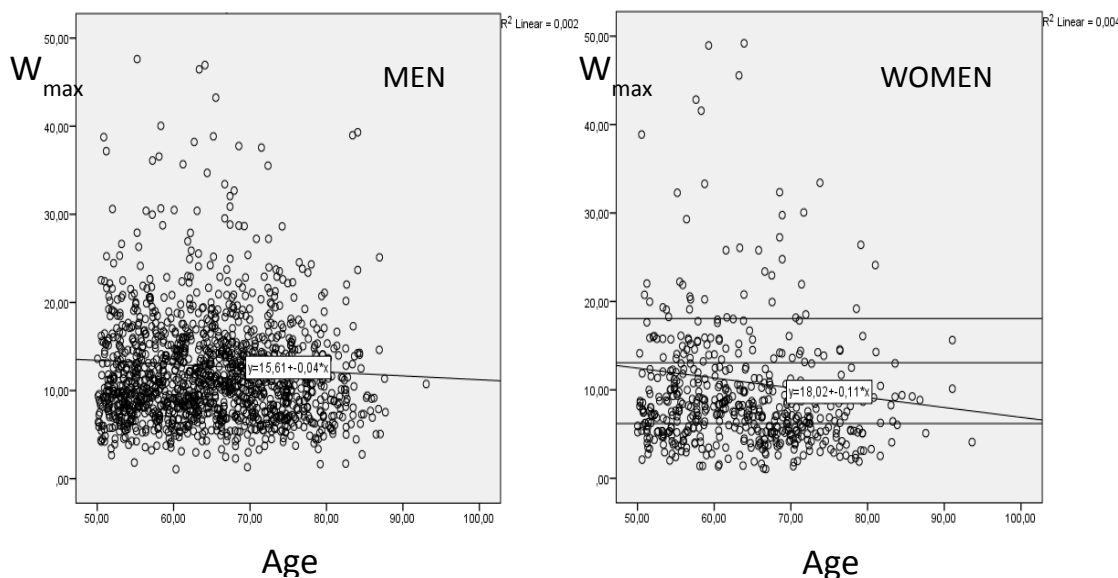
At the time of this definition precise quantification of detrusor maximum contraction work was already possible on the basis of pressure flow analysis. Bladder Working Function (W_{max} ; W/m^2) is a quantification of contraction maximum that associates well with the ICS definition and e.g. with ineffective emptying, relatively independent from the existence of bladder outlet obstruction. Large scale clinical epidemiology of detrusor underactivity in relation with age is never reported and we report a large series of precise pressure flow contraction analysis results.

Study design, materials and methods

We have evaluated 2015 consecutive pressure/flows of voidings that were representative according to the patient. Pressure flows were performed, after ICS standard seated water filled external pressure sensor saline medium fill cystometry, in privacy and in preferred position (in men -N =1455- 75% standing) with a 7F double lumen catheter. W_{max} ; $P_{det,max}$ and Q_{max} were evaluated and compared between men and women. All patients included in this analysis were >50y and were referred because of bothersome lower urinary tract symptoms and signs. Voidings that were considered representative by the patients are analysed because the situation during urodynamic testing may provoke unrepresentative micturition (caused by sympathetic dominance = 'stress') that inhibits detrusor contraction and or outlet relaxation. No patient had undergone relevant surgery or had relevant neurological abnormalities.

Results

The two graphs show that both men and women had a decline in maximum contractility. In men however the decline, associated with older age (X-axis), was slightly less than in women. R^2 men 0.019 and R^2 in women 0.025.



The table shows that men had on average significantly higher voiding pressures ($P_{det,max}$) and not statistically significant lower maximum flow rates (Q_{max}). Especially group average $P_{det,max}$ (see table) is significantly higher in men as a signal of the higher prevalence of bladder outlet obstruction in this group.

n= 2009	MEN mean, sd.	WOMEN	p diff
Q_{max}	29,4 (41,7) mL/s	30,7 (58,6) mL/s	.557
$P_{det,max}$	79,0 (37,1) cmH ₂ O	43,6 (30,3) cmH ₂ O	.000
W_{max}	12,8 (10,0) W/m ²	10,9 (15,0) W/m ²	.002

Interpretation of results

In patients >50 years referred with lower urinary tract signs and symptoms, these data 'predict' an average decline of maximum detrusor contraction of $\pm 3.3 W/m^2$ (women) or $\pm 1,2 W/m^2$ (men) can be observed in a period of ± 30 years. A value of $2 W/m^2$ represents $\pm 20\%$ of the normal maximum. Longitudinally interpreted it may be suggested that men 'lose' $\pm 15\%$ of their maximum detrusor contraction power in 30years and women $\pm 35\%$. These were all symptomatic persons, but able to void 'almost' as usual after/during cystometry, therefore the sample cannot be interpreted as a population based or longitudinally followed sample.

However these patients are representative for the cohort of persons with LUT symptoms. The male bladder outlet -with higher outlet resistance than women- causes a muscle training effect (challenges the detrusor towards more work during voiding) and seems therefore also to protect somewhat against 'detrusor muscle ageing'.

Concluding message

This large sample study of a large age range cohort quantifies the age related decline of detrusor maximum work during a subjectively representative voiding. The difference in maximum detrusor work in elderly women with symptoms of lower urinary tract dysfunction versus the somewhat younger women is larger than the difference over the similar age range in men.

Disclosures

Funding: none **Clinical Trial:** No **Subjects:** HUMAN **Ethics not Req'd:** no persons involved, data of routine testing used
Helsinki: Yes **Informed Consent:** No