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Title: THE EFFECTS OF INCREASING THE URINE OUTPUT ON ISOVOLUMETRIC BLADDER PRESSURE OF ELDERLY MALES: RESULTS FROM A PILOT STUDY

Aims of study:

Lower Urinary Tract Symptoms (LUTS) are a very common but difficult problem to manage in general practice. It is often assumed that a benign enlargement of the prostate - Benign Prostatic Hyperplasia (BPH) - is the key factor in the development of LUTS. However, it is still impossible to support this hypothesis with scientific evidence. Because of its crucial role in the micturition cycle and because the prevalence of obstruction seems almost equal in both symptomatic and asymptomatic men, bladder dysfunction is often considered to be a key factor in the development of LUTS. Improvement of bladder function may therefore be a promising approach in the prevention and treatment of LUTS.

Several animal studies[1] have shown that, as a result of a 3-fold increase in urine output, compliance and contractility of the bladder increased significantly. In addition, diuresis-induced hypertrophy protected the rat bladder from the contractile defects that usually follow partial outflow obstruction[2]. Apparently the bladder muscle is able to adapt to its load just like skeletal muscle. The aim of the present pilot study is to investigate if the same mechanism of adaptation can be triggered in humans, prior to testing the efficacy of this intervention at a larger scale.

Methods:

We selected 7 elderly men between 55-75 years. In a human population diuresis can be induced by drinking additional water. Therefore, the intervention consisted of drinking two litres of additional water per day for a period of two months. We performed isovolumetric bladder pressure measurements at baseline, after 1, and after 2 months. Isovolumetric bladder pressure was measured noninvasively with the variable outflow resistance catheter[3], that consisted of three parallel tubes connected to the outflow opening of an incontinence condom. The subjects voided through the tubes and a pneumatic valve was fitted over each tube to interrupt the flow rate through it. A pressure transducer was installed at the level of the catheter to record the pressure (cmH₂O) in the condom. As long as there is an open connection between the bladder and the catheter during the flow interruption, the pressure measured in the catheter is equal to the bladder pressure. Each subject was measured twice at one day. Final analyses were performed with the highest recorded pressure. Subjective measurements of voiding function included a Visual Analogue Scale (VAS) for perceived force of the stream (0-100mm), and global perceived improvement of voiding function (7-point scale). The statistical significance of improvement in isovolumetric bladder pressure and VAS-score was tested with the Friedman test (two sided, $\alpha=0.05$).

Table 1: Mean scores on isovolumetric bladder pressure and perceived force of stream at baseline and after 1 and 2 months. (N=7)

Outcome parameter		baseline Mean (SD)	after 1 month Mean (SD)	after 2 months Mean (SD)	P-value
Bladder pressure*	(cmH ₂ O)	99 (10)	111 (19)	119 (19)	0.097
Force of stream*	(mm)	45 (16)	50 (18)	54 (16)	0.076

**Note: A high score is favourable for the patient.*

Results:

7 men aged 62 ± 3 years (mean \pm SD) volunteered to participate in this pilot study. Drinking two litres of additional water showed to be no problem. The subjects experienced no discomfort during the measurements. Table 1 shows the mean scores for isovolumetric bladder pressure and force of stream. Both isovolumetric bladder pressure and perceived force of stream improved gradually during the intervention period. However, the differences between the measurements did not reach statistical significance. Four men experienced an improvement, and three men experienced no improvement of global voiding function. No subjects experienced a deterioration of their voiding.

Conclusions:

We wanted to gain insight into the effects of drinking two litres of additional water per day. Although not statistically significant there was a notable improvement in isovolumetric bladder pressure during the intervention period. Besides, most subjects experienced an improvement of their voiding function. On the basis of these findings we conclude that it is worthwhile to study our hypothesis more thoroughly.

[1] J Urol 1993; 150(1):204-208

[2] Urology 1999; 54(1):183-187

[3] J Urol 2001; 165: 647-652

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