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DETRUSOR CONTRACTILITY: ORDER OUT OF CHAOS

Aims of Study
Impairment of detrusor contractility is common in older people of both sexes, and is important because its association with retention, detrusor overactivity (in DHIC) and outlet obstruction complicates management. An adequate contraction must be both *strong* enough and well enough *sustained* to empty the bladder. Contraction strength may be estimated from the isovolumetric pressure attained during various types of stop test, or during an uninterrupted pressure-flow study by various nomograms or calculations. Clinical experience suggests that there may be large discrepancies among the results given by this confusing multiplicity of methods (developed primarily for investigation of males), especially for female subjects, but few comparative studies have been reported in the literature. We aimed to investigate the consistency of different methods of measuring detrusor contraction strength in older females and if possible to identify the best one.

Methods
We retrospectively analyzed baseline urodynamic data from 100 females (> 60 y). All had urge incontinence and were enrolled in a drug trial. Stop tests (voluntary interruption, mechanical interruption, and continuous mechanical occlusion of the flow) were performed on each subject after successful coaching. Contraction strength during pressure-flow studies was calculated from the projected isovolumetric pressure PIP, defined as ($p_{det.Qmax}+K*Q_{max}$), which is an estimate of the isovolumetric pressure that would be attained in a hypothetical stop test. It is equivalent to the bladder contractility index (BCI or DECO, defined as PIP/100), and is derived from Schäfer's contractility nomogram. For all these methods K is taken semi-arbitrarily as 5 cm H_2O/(ml/s); for this study we also investigated other values of K. Follow-up data from 82 of the original 100 females were used to validate the conclusions.

Results
Isovolumetric detrusor pressure was lower for voluntary than for mechanical stop tests (mean $\pm$ SD = 31.2$\pm$16.0 cm H_2O versus 46.1$\pm$25.0 cm H_2O, $p < 0.01$). The continuous occlusion (48.7$\pm$24.9 cm H_2O) and mechanical values did not differ significantly and were highly correlated ($r = 0.87$). The mean isovolumetric pressure predicted from pressure-flow studies by the PIP/BCI/DECO method (133.3$\pm$44.6 cm H_2O) far exceeded and was poorly correlated with measured values ($r = 0.21$, $p = 0.60$). However, consistency was optimized by reducing K to 1 cm H_2O/(ml/s), yielding an index DECO1 which accurately predicted isovolumetric pressures (mean difference 0.30 cm H_2O; 95%CI –5.22 to 4.63 cm H_2O; $p = 0.20$) and had a stronger correlation with them ($r = 0.52$, $p < 0.01$). Follow-up data confirmed these results.

Conclusions
In elderly females in this patient population, mechanical or continuous occlusion stop tests and the new index DECO1 all give consistent estimates of isovolumetric pressure, representing detrusor contraction strength. Each method has advantages and disadvantages. DECO1 is easy to determine because it involves no interference with a standard pressure-flow study; however, it is not particularly reliable and not very responsive to small changes in contraction strength. The mechanical and continuous occlusion tests are more reliable but both require an intravesical balloon to occlude the bladder neck; the mechanical stop test may be easier for the patient to perform, but the continuous occlusion test is more responsive to small changes.

In this patient group, voluntary stop tests, the older index BCI/DECO, and Schäfer's nomogram give incorrect results and should no longer be used.