

## **DETRUSOR THICKNESS AS THE MAIN PREDICTOR FOR RISK OF DAMAGE OF THE UPPER URINARY TRACT IN CHILDREN WITH LOWER URINARY TRACT SYMPTOMS**

### Hypothesis / aims of study

Detrusor thickness is the main non-invasive predictor for the upper urinary tract in children suffering from symptoms of the lower urinary tract (LUTS). Combining ultrasound assessment of detrusor thickness and the EMG-urowflow is an efficient non-invasive diagnostic tool.

### Study design, materials and methods

Virginal children with several LUTS and healthy children were enrolled.

Standardized investigations beside the ICI recommendations (1) used were:

1. Ultrasound measurement of detrusor thickness at a bladder volume > 50%/age-adjusted FBC (2) with a 7.5 MHz transducer (3). For the upper urinary tract and post void residual a 3.5 MHz transducer was used. Patients were grouped according to 1 mm (D1), 2 mm (D2), and 3 and more mm (D3).
2. Beside established Uroflow parameters EMG-baseline and -activity during micturition was categorized (minor, good, or unchanged relaxation, increased or highly increased contraction). Pelvic floor contractions and amplitudes, flow portions and -shapes were assessed.

### Results

208 children were investigated (95 girls, 113 boys, mean 7.92 y). Clinical diagnoses:

Healthy (15), PNE (13), OAB (36), vesico-urethral reflux (4) and dysfunctional voiding in combinations (140) as vesico-urethral reflux (45), encopresis (40) and recurrent urinary tract infection (UTI) (27). Patients were subgrouped as D1 (134), D2 (58), and D3 (16).  $Q_{max}$  was no reliable variable in dysfunctional voiding or VUR. Patients with detrusor hypertrophy (D2, D3) had either dysfunctional voiding (53) or OAB without dysfunctional voiding (10). All dysfunctional voiders had increased or highly increased EMG amplitude and holding manoeuvres during micturition. All patients suffering from enuresis with or without dysfunctional voiding had just a detrusor thickness of 1 mm.

Vesico-urethral reflux in D1-patients was found in 21 (16%) of which 13 also had UTI, in D2-patients in 20 (34%) with 13 children suffering from UTI and in D3-patients in 8 (50%) where 6 had UTI.

### Interpretation of results

In cases with increased detrusor thickness, addition of EMG-urowflow avoids diagnostic pitfalls and minimizes invasive procedures. Dysfunctional voiding causes other LUTS and should be treated primarily. Correlations between clinical findings and measured variables are highly improved when the minimal diagnostic approach of ultrasound in combination with EMG-urowflow is applied. The demonstrated correlation of increased detrusor thickness and vesico-urethral reflux proves the ability of identifying children with increased risk of damage of their upper urinary tract by measuring their detrusor.

### Concluding message

Combining ultrasound assessment of the detrusor thickness and EMG-urowflow allows a precise diagnosis, while detecting risk factors and avoid invasive procedures and treatment failures.

References:

- (1) Conservative Management of Urinary Incontinence in Children, Int. Consultation on Incontinence, 2<sup>nd</sup> Edition 2002: 513, 2002
- (2) Urodynamics in normal infants and children, Scand. J Urol Nephrol, Suppl. 114: 20, 1988
- (3) Detrusor thickness in healthy children assessed by a standardized ultrasound method, J Urol 166: 2364-2367, 2001

**FUNDING:           unrestricted           educational           grant           by           Ferring**