

COMPENSATION MECHANISM IN BLADDER OUTLET OBSTRUCTION (BOO) – THINKING OUTSIDE THE BOX

Hypothesis / aims of study

BOO is the major cause of voiding dysfunction in men. Several acknowledged nomograms categorize the grade of subvesical obstruction with respect to elevated detrusor pressure. The cornerstone of these nomograms is the assumption that bladder outlet obstruction with its physically elevated renitency leads to elevated pressure in the bladder. However in other hollow organ systems, i.e. cardiovascular system, there are more compensation mechanisms possible. Beside the elevation in pressure, which is known as concentric, there is also dilatative compensation which is caused by volume exposure and not by elevated pressure. Unfortunately these important factors are not well understood and researched. Scientific data are lacking.

Study design, materials and methods

We retrospectively analyzed all videourodynamical examination of 3850 patients in our centre in the time period from 07/2001 till 12/2012. All examinations were performed in a standardized manner according to the ICS guidelines.

We included all patients with main diagnoses “bladder outlet obstruction”.

We categorized these patients in three groups.

Group 1: underactive detrusor, defined as detrusor pressure at maximum flow below 30 cmH₂O

Group 2: regular detrusor, defined as detrusor pressure at maximum flow between 30 and 50 cmH₂O

Group 3: overactive detrusor, defined as detrusor pressure at maximum flow higher than 50 cmH₂O

All subgroups were statistically analyzed by Kruskal-Wallis-test with a statistical power of 80%.

Results

We could evaluate a total of 4435 videourodynamical examinations in 3850 patients.

We observe bladder outlet obstruction in 1411 patients, 284 women and 1127 men.

Thus represents a total of 36.65% of the patient population.

All urodynamical results are presented in table 1.

Tab. 1*: concentric (group I) vs normal (group II) vs dilatative (group III) vesicomypathy

	Group I n = 284	Group II n = 337	Group III n = 702
Micturition frequency (MF) / day	6.1 (± 3.9)	6.1 (± 3.4)	6.5 (± 4.4)
Maximum cystometric capacity (MCC) / ml	560.0 (± 272.4)	454.2 (± 215.1)	377.8 (± 165.2)
Post void residual (PVR) / ml	348.9 (± 319.8)	168.5 (± 216.4)	140.1 (± 149.1)
Flow rate (FR) / ml/s	10.2 (± 3.5)	9.6 (± 0.7)	8.6 (± 0.3)

±: standard deviation

Non-parametric test, like Kruskal-Wallis and Mann-Whitney showed highly significant differences between all groups in MCC and PVR. No statistical differences were observed in MF and FR.

Interpretation of results:

In patients with BOO, we could observe three different groups of compensation.

There are highly significant differences in important urodynamical parameters such as maximum cystometric capacity and post void residual.

No significant differences were observed in micturition frequency and flow rate, suggesting that symptoms are also similar in these patients. Further subgroup analyses are performed.

With respect to compensation mechanism in hollow organ system to obstruction we observed three different vesicomypathies in BOO.

a) Concentric vesicomypathy

b) “Normal” vesicomypathy

c) Dilatative cesicomypathy

The acknowledged nomograms are highly specific and sensitive for BOO and concentric vesicomypathy.

However, for excentric vesicomypathy, these nomograms should be amended with respect to significant parameters indicative of the dimension of volume, which is reflected in increased post void residual.

Concluding message

Compensation of BOO results in three possible mechanism which include the possibility of decreased, increased and regular pressure of the detrusor. However important parameter such as post void residual is not addressed in nomograms, based on the results of this study PVR must be an essential part.

Disclosures

Funding: None **Clinical Trial:** Yes **Public Registry:** No **RCT:** No **Subjects:** HUMAN **Ethics Committee:** ÄK Saarland **Helsinki:** Yes **Informed Consent:** Yes