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FREE UROFLOWMETRY VERSUS PRESSURE-FLOW STUDY IN THE DIAGNOSIS OF AN OVERACTIVE BLADDER SYNDROME IN FEMALE PATIENTS.

Hypothesis / aims of study
Recently, the Flow Index (FI) was proposed as overactive bladder (OAB) urodynamic objective marker. It is calculated as a division of average urethral flow rate to maximal urethral flow rate. Interestingly, no linear and nonlinear correlation between micturition volume and FI was found. When using Receiver Operating Characteristic (ROC) the area under the curve (AUC) for FI was as high as 0.722, which clearly indicates that it is a good parameter which allows distinguishing between the OAB group from the rest of the patients. The cut-off point of FI value was 0.47 with sensitivity, and specificity at 69.8% and 69.9%, respectively [1]. The diagnosis of OAB is mostly based on patients' symptoms and bladder diary, but the objective tool for diagnosis confirmation is still needed. As there is evidence that the results of free uroflowmetry and pressure-flow study (PFS) do not differ it may appear that the utility of these studies in the diagnosis of OAB, with additional marker – Flow Index - is similar.[2]
The aim of current study was to determine if the PFS parameters, including FI, could increase the accuracy of urodynamic study (UDS) in the diagnosis of OAB syndrome.

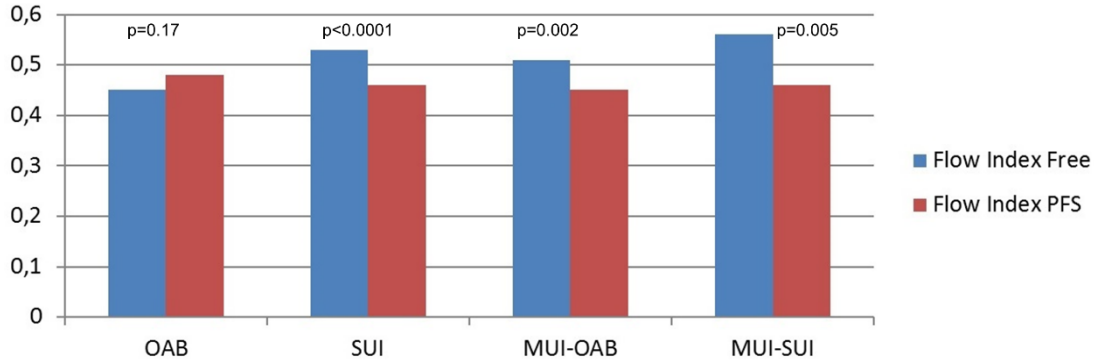
Study design, materials and methods
This was a retrospective study evaluating medical history and urodynamic examination results of female patients who were diagnosed for LUTS between January 2014 and December 2015. All patients presenting clinically significant prolapse (stage III or IV, POPQ scale) and/or BOO were excluded from the study as well as patients with maximal urethral flow lower than 10 ml/s. Patients voided when normal desire to void feeling starts and were told to avoid abdominal straining during the free uroflowmetry and PFS. Three channel catheter (7Fr) and rotating disc flowmeter were used. All patients signed informed consent before each urodynamic study and accepted to use medical records for scientific purposes.
For statistical analysis Statistica 12PL was used. For the groups characteristics descriptive statistic was used including means, ranges and standard deviations. To compare Flow Index calculated basing on free uroflowmetry and pressure-flow study, student t-test for dependent samples was used. ANOVA and post-hoc tests (NIR, Tukey's) were performed to compare Flow Index value in each group presenting urinary incontinence, depending on uroflowmetry type. All p values <0.05 were considered as statistically significant.

Results
A total number of 179 medical records were included into the study. Patients were stratified into 4 groups depending on the type of LUTS: OAB, SUI and mixed urinary incontinence with predominant stress incontinence symptoms (MUI-SUI) or predominant overactivity symptoms (MUI-OAB). The diagnosis of each type of urinary incontinence was made by direct questioning, vaginal examination and UDS. There was no statistically significant difference between groups concerning demographic data (age, parity, BMI). OAB was diagnosed in 26 (15%) patients, stress urinary incontinence in 93 (52%) patients, MUI-OAB in 43 (24%) patients, and MUI-SUI in 17 (9%) patients. Flow index calculated during free uroflowmetry (FI-free) was significantly lower in OAB group comparing to the other groups ($p<0.01$). Analysis revealed no difference in FI-free value between SUI, MUI-SUI and MUI-OAB group. Results concerning comparison of FI-free versus FI calculated during pressure-flow study (FI-PFS) are shown on Figure 1. Significant differences were found in most free uroflowmetric parameters, including FI, between study groups, whereas we did not find similar differences in PFS parameters. On the other hand we did not find any statistically significant differences of FI-PFS value between the study groups. Average urethral flow rate was significantly higher in SUI group when compared to OAB group (17.8 ml/s *vs* 11.56 ml/s, $p<0.01$) and significantly higher in SUI group comparing to MUI-OAB group (17.8 ml/s *vs* 12.97 ml/s, $p<0.01$). Maximal urethral flow during free uroflowmetry was significantly lower in OAB group comparing to SUI group (23.37 ml/s *vs* 32.58 ml/s, $p<0.01$). The only significant difference between groups in PFS was found for micturition volume which was lower in OAB group *vs* SUI group (325.5 ml *vs* 385.6 ml; $p=0.005$).

Interpretation of results
In the current study we confirmed the supportive objective role of Flow Index in the diagnosis of OAB. What is more important, non-invasive study is more accurate as an objective OAB marker than invasive PFS. We have found that decrease of urethral lumen in OAB patients does not influence on the value of FI in both flow measurements. Whereas, in SUI patients presence of the catheter in the urethra decreased average flow rate causing statistically significant difference in FI value calculated during free uroflowmetry *vs* PFS (0.53 *vs* 0.46 respectively, $p<0.0001$). This result may suggest that the strength of the detrusor muscle contraction in SUI patients is lower when compared to OAB patients and is convergent with the data from the literature [3].

Concluding message
Flow Index may serve as an important objective OAB diagnostic tool but only when calculated from free uroflowmetry parameters in assessing patients with LUTS.

Fig.1. Distribution of Flow Index (mean) in particular LUTS groups



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Disclosures

Funding: NA **Clinical Trial:** No **Subjects:** HUMAN **Ethics Committee:** Committee on Bioethics Medical University of Lublin **Helsinki:** Yes **Informed Consent:** Yes