Hypothesis / aims of study
To identify women at risk for bladder outlet obstruction (BOO), a nomogram incorporating pressure-flow data from women with clinical obstruction across 3 different obstructive mechanisms and controls was developed for use in the clinical setting.

Study design, materials and methods
Following IRB approval, urodynamic data from 3 groups of women with BOO were reviewed, including Group 1: obstruction after sling placement, Group 2: large symptomatic Stage 3-4 cystocele, Group 3: meatal stricture or distal urethral fibrosis. BOO diagnosis was based on history, presenting symptoms, exam findings, and site of obstruction confirmed on lateral voiding cystogram. Excluded patients had neurogenic bladder, complete retention, or straining during voiding. Urodynamic testing was performed according to ICS guidelines as reported before (1). All UDS tracings were reviewed by a neutral investigator with UDS training not involved with patient care (OG). The optimal combination of maximal flow rate (Qmax) and detrusor pressure at maximal flow rate (PdetQmax) for determining BOO was calculated using nonparametric receiver operating characteristic (ROC) curves. Box and whisker plots were used for group comparison. Age, BMI, Qmax, PdetQmax, volume voided, and post-void residual were considered as risk factors. Using logistic regression to first find the best-fit model of the risk factors, a nomogram was then built based on the results of the model.

Results
In the past 9 years, 146 consecutive women with clinical anatomic BOO were investigated in comparison to 42 age-comparable controls (age >40). Mean age was 61 (range: 41-87) for BOO group and 63 (range: 42-85) for controls. The area under the curve for the ROC was 0.886 for Qmax and 0.778 for PdetQmax. For the Qmax cut-off of 15, the sensitivity and specificity were 0.78 and 0.82 respectively, while for PdetQmax cut-off of 25, they were 0.76 and 0.72 respectively. Age, Qmax, and PdetQmax were similar among the three BOO groups, except for lower Qmax in Group 3 versus Group 1. Of the several variables entered in the design of the nomogram, the dominant ones were found to be Qmax and PdetQmax. Therefore a nomogram was developed using the full dataset and Qmax and PdetQmax. For clinical application, we focused on the portion of the nomogram with a PdetQmax pressure range of 2-50 cmH2O and a Qmax range of 5-25 ml/sec.

Interpretation of results
Defining BOO in women remains very challenging (1). This study revisits prior cut-off values and builds on a series of age-comparable controls to design a new nomogram. Only women who are able to void without straining might benefit from this obstruction odd information, which remains interconnected with the clinical symptomatology and examination findings.

Concluding message
This new data confirms and reinforces prior data on cut-off intubated pressure-flow values for BOO in women (1). The anatomic etiology of obstruction did not seem to influence these cut-off parameters. In addition, a nomogram based on age-comparable controls and predominantly weighted on Qmax and PdetQmax was produced that will now have to be tested in the clinical setting to predict the likelihood of obstruction in women.
Figure 1. Odds of Obstruction Based on a Logistic Regression Model of Qmax and PdetQmax

Figure 2. Nomogram for the Odds of Bladder Outlet Obstruction

References
1. Urology 64: 675-681, 2004

Disclosures
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