

## **NOMOGRAM FOR PROBABILITY OF BLADDER OUTLET OBSTRUCTION BASED ON PRESSURE-FLOW STUDIES FROM ANATOMICALLY OBSTRUCTED WOMEN**

### 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 (Q<sub>max</sub>) and detrusor pressure at maximal flow rate (P<sub>det</sub>Q<sub>max</sub>) for determining BOO was calculated using nonparametric receiver operating characteristic (ROC) curves. Box and whisker plots were used for group comparison. Age, BMI, Q<sub>max</sub>, P<sub>det</sub>Q<sub>max</sub>, 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 Q<sub>max</sub> and 0.778 for P<sub>det</sub>Q<sub>max</sub>. For the Q<sub>max</sub> cut-off of 15, the sensitivity and specificity were 0.78 and 0.82 respectively, while for P<sub>det</sub>Q<sub>max</sub> cut-off of 25, they were 0.76 and 0.72 respectively. Age, Q<sub>max</sub>, and P<sub>det</sub>Q<sub>max</sub> were similar among the three BOO groups, except for lower Q<sub>max</sub> in Group 3 versus Group 1. Of the several variables entered in the design of the nomogram, the dominant ones were found to be Q<sub>max</sub> and P<sub>det</sub>Q<sub>max</sub>. Therefore a nomogram was developed using the full dataset and Q<sub>max</sub> and P<sub>det</sub>Q<sub>max</sub>. For clinical application, we focused on the portion of the nomogram with a P<sub>det</sub>Q<sub>max</sub> pressure range of 2-50 cmH<sub>2</sub>O and a Q<sub>max</sub> 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 Q<sub>max</sub> and P<sub>det</sub>Q<sub>max</sub> 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

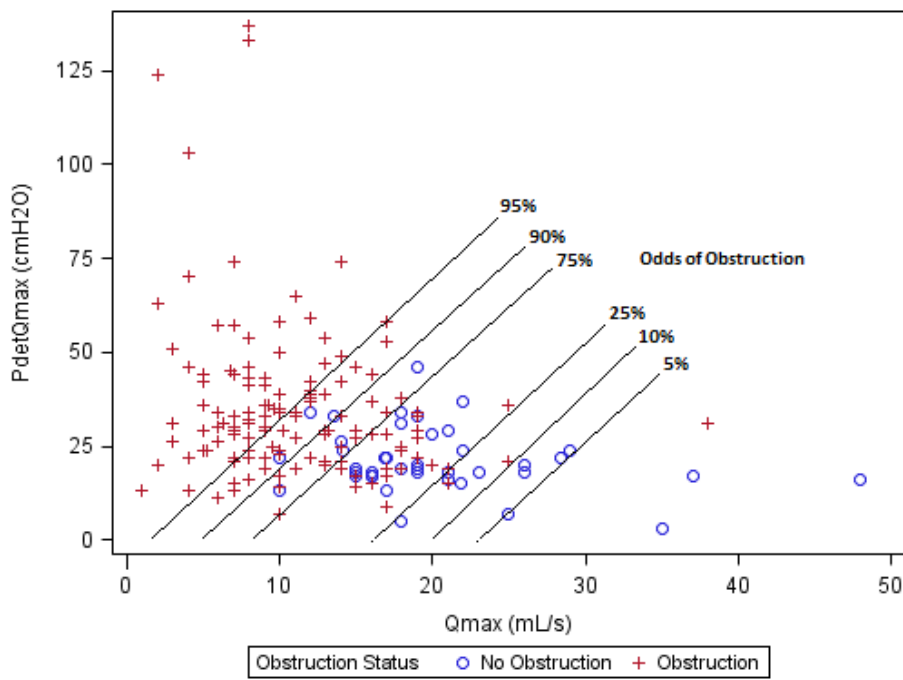
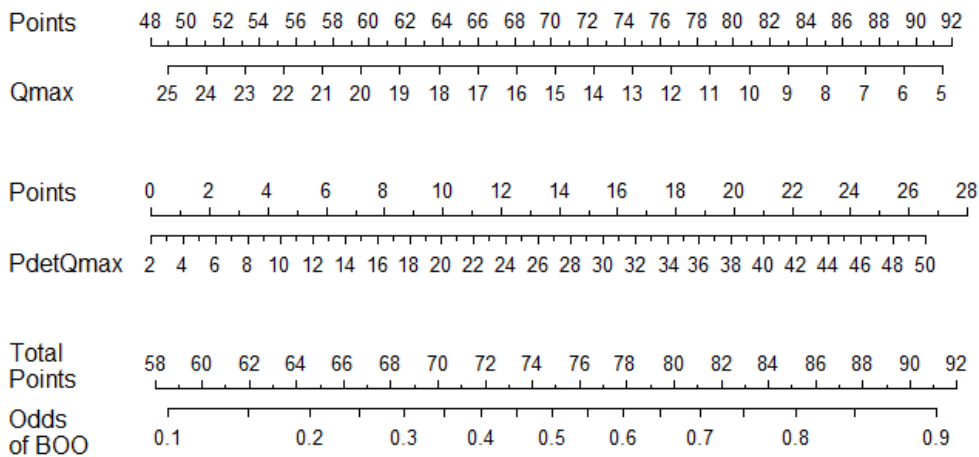


Figure 2 Nomogram for the Odds of Bladder Outlet Obstruction



References

1. Urology 64: 675-681, 2004

Disclosures

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