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CUT-OFF VALUES TO DEFINE BLADDER OUTLET OBSTRUCTION (BOO) IN WOMEN

Hypothesis / aims of study

Diagnosing BOO in women is arduous. Symptoms, clinical examination, free uroflowmetry, radiographic and endoscopic findings do not establish a definitive diagnosis and the results of the pressure flow study may be difficult to interpret because of several criteria without any unanimous consensus.
The aim of this study is to define cut-off values in urodynamic parameters which will serve to identify female BOO.

Study design, materials and methods

We studied 780 consecutive female patients, using our standard urogynaecological protocol which includes: case history, symptoms questionnaire, uro-gynaecological and neurological examination, dynamic ultrasonography, urodynamic and/or videourodynamic tests. Exclusion criteria were recurrent lower UTI, bladder stones or tumours, suspected neuropathy, complete urinary retention and incomplete or non-evaluable pressure/flow study (i.e. no micturition during the test). All patients underwent urodynamic tests according to ICS criteria. Patients with abdominal straining (arbitrarily defined as abdominal pressure over 10 cm H_2O) during voiding were excluded to prevent abdominal straining-related artefacts in the analysis of P/F curves.
The patients were divided into two groups "obstructed" (n= 65) which included women with severe obstructive symptoms and major descensus (Cystocele > grade 2) and "controls" (n=101) who had no signs or symptoms of obstruction, no previous history of pelvic surgery for incontinence, no descensus (cystocele, urethrocele, rectocele or uterus prolapse), no urethral pathology as shown by clinical examination and ultrasound findings.
Statistical analysis was based on the following parameters: Q_{max} during free uroflowmetry; $p_{det}Q_{max}$, Q_{max} and Uretral Efficency at Q_{max} (UE_{Qmax}) of PUMA in P/F study. ROC curves to determine the optimal cut-off values were used. Sensitivity and specificity were calculated for different cut-off values. The Agreement Kappa test was used to assess the capacity of the different methods (Chassagne, Lemak, Romanzi, Blavais) (1) to classify obstructed patients correctly.

Results

In the "controls" (101 patients, mean age 55.9±10.3) the mean Q_{max} free was 27.8±12.5 ml/s (median 26.5 ml/s; interquartile range (IR) 18 to 37 ml/s), the mean $p_{detQmax}$ was 19.7±9.9 cmH_2O (median 16 cmH2O; IR 12-28.5 cmH2O), the mean Q_{max} in P/F study was 22.3±7.8 ml/s (median 21.2 ml/s; IR 17.3 - 27.2 ml/s) , the mean UE_{Qmax} was 99.2±40.5 (median 87; IR 74 -124).
In the "obstructed " group (65 patients, mean age 62.5±10.5) the mean Q_{max} free was 16.4±9.1 ml/s (median 12.8 ml/s; IR 10-20.3 ml/s), the mean $p_{detQmax}$ was 33.8±17.8 cm H_2O (median 30 cmH2O; IR 20.5-45 cmH2O), the mean Q_{max} in P/F study was11.2±6.9 ml/s (median 9 ml/s; IR 5.9-16 ml/s) , the mean UE_{Qmax} was 49.5± 32.5 (median 37; IR 26-69).
Significant differences emerged in the two groups for Q_{max} free ($p<0.0001$), $p_{detQmax}$ ($p< 0.0001$), Q_{max} in P/f study ($p<0.0001$) and UE_{Qmax} ($p<0.0001$).
In the absence of a well-defined gold standard for obstruction, clinical symptoms and severe cystocele were used as surrogate gold standard to construct the ROC curves (figs 1,2,3,4). For Q_{max} free , the area under the curve (AUC) was 0.78 (SE 0.04). In an attempt to balance sensitivity and specificity, the best peak free flow rate cut-off was 21.15 ml/s (sensitivity 81.6%, specificity 64.1%). For $p_{detQmax}$ the AUC was 0.76 (SE 0.04), the best value was 23.5 cm H_20 (sensitivity 68.8%, specificity 66.7%). For Q_{max} in P/Fstudy the AUC was 0.87 (SE 0.03), the best value was 16.5 ml/s (sensitivity 79.7%, specificity 79.2%). For UE_{Qmax} the AUC was 0.86 (SE 0.03), the best value was 70.5 (sensitivity 78.1%, specificity 77.1%). When $p_{detQmax}$ and Q_{max} were considered together ($p_{detQmax}$ - 2* Q_{max}) as in the P/Fstudy in men (2) the AUC was 0.86 (SE 0.03), the best value was –11.5 (sensitivity 78.5%, specificity 75.0%) (Fig. 5).

The Agreement Kappa test showed the BOO classification capacity of the different methods as: Chassagne K= 0.53, Lemack K=0.49, Romanzi K=0.46 and Blavais K=0.19.

Interpretation of results

In our study different cut-off values of urodynamic parameters were obtained from ROC curves for BOO in women. Q_{max} free was most unbalanced in specificity and sensitivity.When it is < 21.15 ml/s the probability of BOO is very high. The $p_{detQmax}$ curve had the lowest specificity and sensitivity. The Q_{max} curve in the P/F study, UE and $p_{detQmax}$ - 2* Q_{max} all had the same areas under their curves (AUC) and overlapping specificity and sensitivity values. The BOO classification capacity was moderate for the Chassaigne, Lemack and Romanzi methods and poor for the Blaivas method.

Concluding message

The additional parameters provided by the PUMA method of analysis offer some advantage (detrusor contractility and pathology-related curves) (3) over the other urodynamic parameters (in P/F study: $p_{detQmax}$ > 23.5 cm H_2O; Q_{max} < 16.5 ml/s; $p_{detQmax}$ - 2* Q_{max} >-11.5) which do, however, detect BOO in women satisfactorily .

References

1) Neurourol Urodyn 19:533, 2000
2) Neurourol Urodyn 16:1-18, 1997
3) Neurourol Urodyn 22:206-222, 2003

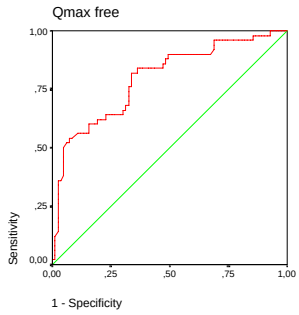

Fig. 1

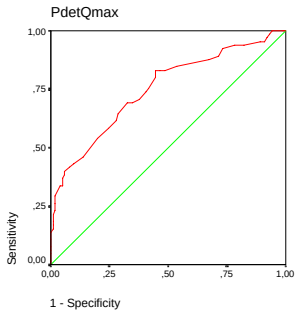

Fig.2

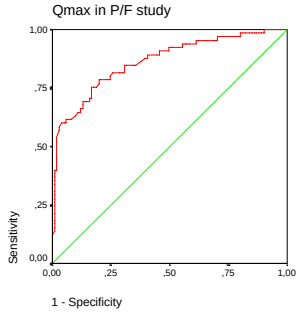

Fig. 3

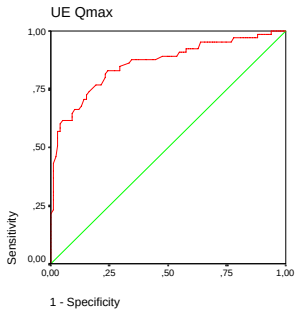

Fig. 4

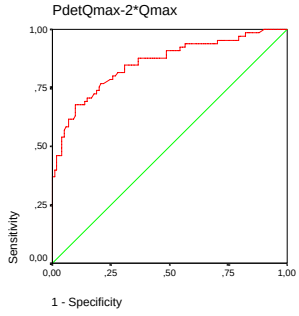

Fig.5