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Maximum urinary flow differences between free-flow and pressure-flow study in women: effect of bladder outlet obstruction versus detrusor underactivity.

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Hypothesis / aims of study

❖Pressure recording urethral catheter during pressure-flow (P-F) study may increase the outflow resistance and subsequently reduce the maximum flow during invasive urodynamic study (UDS).
❖Our main purpose was to examine the differences in maximum flow rate between free uroflow (f-Qmax) and P-F study (Qmax) in women.
❖Consequently, we investigated whether a urodynamic diagnosis of bladder outlet obstruction (BOO) as opposed to detrusor underactivity (DU) could have a greater impact on the Qmax differences.

Study design, materials and methods

✓ Retrospective study
✓ Women submitted to invasive UDS due to LUTS and/or incontinence which were refractory to conservative treatment and/or pharmacotherapy.
✓Based on previous work aiming to optimize the diagnosis of BOO versus DU in women (1,2) we categorized women based on:
▪ the bladder outlet obstruction index (BOOI)
▪the urethral resistance association (URA)
into three groups:
❖**Definitive obstruction** (Group A: URA ≥ 20+BOOI ≥ 20)
❖**Equivocal obstruction** (Group B: BOOI = 1-19 + URA=1-19)
❖**Without obstruction** (Group C: BOOI ≤ 0).

Group C women, based on bladder voiding efficiency during free uroflow (f-BVE) were further divided into:
❖ Pure Underactive **(Pure DU)** (f-BVE<80%)
❖ Non obstructive - Non underactive (**non BOO-non DU**) (f-BVE ≥ 80%)
✓Unpaired t test and one way ANOVA were used for statistical analysis.

Results

Table 1

➢A total of 253 women were included in the analysis.
❖**19.36%** (n=49/253) were definitively **obstructed**,
❖**27.7%** were **equivocally obstructed**
❖**53%** (134/253) were **not obstructed**.
➢**The mean Qmax reduction during P-F study was 25.5%.**
➢ The **highest reduction** was observed **among obstructed women**.
➢ The increase of outflow resistance as expressed with BOOI and URA was correlated with a statistically significant reduction of Qmax during P-F study (One way Anova, p=0.001).

Table 2

➢Direct comparison between those with pure DU and those with non BOO-non DU, interestingly found:
❖ there **was no difference** between f-Qmax and Qmax among **underactive women**
❖ the mean **reduction** among **NO BOO-NO DU** was **24%**.

Group	Mean f-Qmax	Mean Qmax	P value	Mean reduction(%)
A (n=49)	9.87	5.88	0.0036	40.4
B (n=70)	15.30	9.99	<0.0001	34.7
C (n=134)	25.72	20.39	0.0002	20.7
Total (n=253)	**19.75**	**14.70**	**<0.0001**	**25.5**

Table 1. Mean differences between f-Qmax and Qmax between the 3 main groups of women.

Group	Mean f-Qmax	Mean Qmax	Pvalue	Mean reduction (%)
Pure DU (n=27)	16.44	16.00	0.866	2.68
Non BOO/non DU (n=107)	28.12	21.34	<0.001	24.09

Table 2. Mean differences between f-Qmax and Qmax in pure underactive compared to non obstructed - non underactive women.

Interpretation of results

✓The pressure recording urethral catheter (6 Ch) used for the pressure-flow study reduce the maximum flow during invasive urodynamic study by approximately 25%.
✓The degree of outflow resistance may produce a further reduction in maximum flow during P-F while
✓Detrusor underactivity seems to have no impact on f-Qmax during an invasive urodynamic study

Conclusions

✓A reduction of at least 20% between Qmax during UDS and f-Qmax during uroflow in women is almost always expected.
✓A reduction of Qmax during P-F study may be indicative of outflow obstruction as opposed to detrusor underactivity, while the higher the reduction the higher could be the degree of BOO.

References

1) Mytilekas K.V., Oeconomou A., Sokolakis I., et al. Defining voiding problems in women: Bladder outlet obstruction versus detrusor underactivity. Eur Urol Suppl. 2014;13(e688)
2) K.V. Mytilekas, E. Ioannidou, M. Kalitzi, et al European Urology Supplements, Volume 14 Issue 2, April 2015 (Abstract 354)