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WHAT SIZE CATHETER SHOULD BE USED IN MEN UNDERGOING PRESSURE/FLOW STUDIES?

Hypothesis / aims of study

Pressure flow studies are the gold standard in assessing men presenting with obstructive lower urinary tract symptoms (LUTS) following failure of medical and conservative therapy. The management plan is determined according to the results of the International Continence Society (ICS) bladder outlet obstruction index (BOOI) nomogram; dividing patients into three categories; unobstructed, equivocal or obstructed. The presence of a catheter in the urethra during the voiding phase might affect the results of the BOOI, thus affecting the decision making.

The aim of this study was to assess the effect of a 16G (1.6mm diameter) catheter on the catheterized intubated flow (IF) and results of the BOOI.

Study design, materials and methods

A retrospective analysis was conducted of an urodynamics database of 5,067 men presenting with LUTS for evaluation of their symptoms between January 2000 and January 2015. Patients were included in the study if they voided $\geq$ 150 ml at the free flow (FF) and the intubated flow (IF). A 16G catheter was used to measure the intravesical pressure and a 7Fr single lumen catheter was used for bladder filling. The 7Fr catheter was removed just before voiding, leaving the 16G catheter in the bladder to measure the voiding pressure.

Multichannel urodynamics were performed according to the recommendations of the International Continence Society (ICS). FF and IF were compared. Maximum flow rate (Qmax), voided volume (VV), post void residual (PVR) and bladder voiding efficiency (BVE) were measured for FF and IF. BOOI was calculated by using Qmax of IF and using Qmax of FF to interpret the position on the ICS nomogram. The statistical analysis was done using the Wilcoxon Signed Ranks Test and the McNemar-Bowker Test to test the difference between the variables.

Results

636 men met our inclusion criteria. The mean age was 57.4 $\pm$ 14.5 years. The mean Qmax during the FF (15.1 $\pm$ 7.5 ml/s) was higher than that of the IF (12.2 $\pm$ 5.6ml/s). This difference was statistically significant (P<0.001). The voided volume was significantly higher at the IF compared to the FF (294.8 $\pm$ 141.5ml vs. 332.4 $\pm$ 125.1ml, P<0.001). The BVE was significantly higher at the IF compared to the FF (87.8 $\pm$ 20.4 vs. 84.2 $\pm$ 21.1%, P<0.001) (Table 1).

Table (1): Urodynamic parameters

Urodynamic Parameters	Free Flow	Intubated Flow	P Value
Qmax (ml/s)	15.1 ± 7.5	12.2 ± 5.6	P<0.001
Initial volume (ml)	381.3 ± 220.6	408.3 ± 212.2	P<0.001
Voided volume (ml)	294.8 ± 141.5	332.4 ± 125.1	P<0.001
Residual volume (ml)	86.7 ± 165.3	75.9 ± 176.5	P<0.001
Residual ratio %	3.48 ± 10.7	2.61 ± 9.28	P=0.055

Wilcoxon Signed Ranks Test

The BOOI was calculated once with the IF Qmax and another time with FF Qmax. Although there were minor changes in the obstructed and unobstructed group, there was a significant change in the equivocal group (Table 2). There was a significant improvement in the BOOI calculated with the FF Qmax (P<0.001).

Table (2): Effect of the 16G catheter on the position on the ICS nomogram

BOOI with FF Qmax	BOOI with IF Qmax		
	Unobstructed	Equivocal	Obstructed
Unobstructed	279 (92.7%)	55 (37.2%)	2 (1.1%)
Equivocal	22 (7.3%)	82 (55.4%)	25 (13.4%)
Obstructed	0 (0.0%)	11 (7.4%)	160 (85.6%)
Total	301	148	187

McNemar-Bowker Test, P<0.001

Power testing of the BOOI with IF and FF was done after controlling for the confounding factor of voided bladder volume using univariate analysis of variance. This also showed a significant improvement with the FF (F=65.1, P<0.001).

Interpretation of results

Although the 16G catheter is a very small catheter compared to the standard double lumen 6Fr catheters used to measure the intravesical pressure, it can have a significant effect on the Qmax. This could result in the upstaging of 14.5% of patients from the unobstructed or equivocal group to the obstructed group thus an unnecessary decision for bladder outlet relieving procedure would have been made. Obviously, the assumption here is that the pressure generated would be the same for both Qmax's during FF and IF, which may not be the case. Nonetheless, it is important to realise that whatever catheter is used, there may be a degree of obstruction generated by the catheter and hence the smallest possible catheter should be used. This data should be

extrapolated to the 6Fr double lumen catheter which will probably have a greater effect in causing obstruction and may be giving false results.

Concluding message

Although the pressure flow studies are considered the gold standard in diagnosing bladder outlet obstruction in men, there are some limitations with regards to catheter size. We would propose that any new ICS Good Urodynamics Practice document should address this issue in light of the finding from this study. We would recommend that the 16G catheter is used to measure voiding pressure in men as opposed to any larger catheters.

Disclosures

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