821

Harding C[1], Horsburgh B[1], Leonard A[1], Griffiths C[1], Dorkin T[1], Pickard R[1], Thorpe A[1]
1. *Freeman Hospital, Newcastle-Upon-Tyne, Uk*

QUANTIFYING THE EFFECTCS OF URODYNAMIC CATHETERS ON URINE FLOW RATE MEASUREMENT.

Hypothesis / aims of study

It is well recognised that the presence of urethral catheters during urodynamic studies (UDS) affects the measurements obtained. With regards to urine flow rate, the values of maximum flow ($Q_{max.p}$) obtained during UDS are thought to be generally lower than those measured in the absence of urethral catheters (Q_{max}). The actual difference reported in the literature varies and is probably dependent on patient characteristics and the type of urethral catheter used. The aim of this study was to investigate the effect of urodynamic catheters across different male urodynamic diagnostic groups in order to both quantify the differences in urine flow measurements and investigate an association with a particular urodynamic diagnosis. We also investigated effect of catheter calibre by comparison of uroflow measurements in patients undergoing UDS with different sized urethral catheters in situ.

Study design, materials and methods

Four groups each comprising 50 consecutive men attending for UDS as part of the investigation of urinary symptoms were included in this study. Group 1 comprised 50 men with normal UDS, Group 2 comprised 48 men with bladder outlet obstruction and Group 3 comprised 50 men with detrusor underactivity. All men in groups 1 - 3 had UDS using a 4 Fr manometer catheter and a 10 Fr filling catheter. In order to investigate the effect of catheter size a fourth group of 50 consecutive men with various urodynamic diagnoses had UDS performed with an 8 Fr dual-lumen urethral catheter in-situ but all other urodynamic equipment used was identical across all 200 patients. In order to standardise the differences between maximum flow rate measured with ($Q_{max.p}$) and without (Q_{max}) catheters results were expressed as percentages across all patient groups. Urodynamic data in each group were recorded and analysed specifically for differences in uroflow parameters using paired Student's T-test and analysis of variance (ANOVA).

Results

198 (99%) of the 200 UDS were suitable for inclusion following independent review; two studies were excluded because of incomplete data. Maximum flow measured during UDS in Men from Groups 1-3 using a 4Fr manometer and 10 Fr filling catheter showed a mean (sd) reduction of 38 (35) % compared to that measured during 'free' uroflowmetry with the average (s.d) value changing from 14 (8) ml/s to 8 (4) ml/s. Analysis using ANOVA showed the reduction in maximum urine flow with the 4 Fr and 10 Fr catheters in situ to be significantly greater amongst men in Group 1 with normal UDS. Results categorised according to urodynamic diagnosis are detailed in Table 1.

Table 1 ***Uroflow parameters with and without a 4 Fr manometer and 10 Fr filling catheter in situ.*** (p-values refer to paired Student's t-tests, VV = voided volume, RV = residual volume, UDS = measured with urodynamic catheters in situ.)

	Group	**Q_{max}** ml/s	**$Q_{max.p}$** ml/s	**p**	**VV** ml	**VV UDS** ml	**p**	**RV** ml	**RV UDS** ml	**p**
Normal	*1*	*22.5*	*11.4*	<.05	*386*	*437*	n.s.	*14*	*37*	<.05
BOO	*2*	*9.3*	*5.8*	<.05	*283*	*337*	n.s.	*71*	*96*	<.05
Detrusor Underactivity	*3*	*10.7*	*6.3*	<.05	*296*	*330*	n.s.	*81*	*100*	<.05

Table 2 ***Uroflow parameters with and without an 8 Fr dual lumen catheter in situ***

	Group	**Q_{max}** ml/s	**$Q_{max.p}$** ml/s	**p**	**VV** ml	**VV UDS** ml	**p**	**RV** ml	**RV UDS** ml	**p**
Smaller (8Fr) Catheters	*4*	*12.9*	*11.5*	n.s	*208*	*341*	<.05	*49*	*68*	n.s.

In contrast Table 2 illustrates the results obtained for Group 4 comprising 50 men who underwent UDS with an 8 Fr catheter in situ showing no significant difference in maximum flow measured with ($Q_{max.p}$) and without (Q_{max}) catheters in situ.

Interpretation of results

For 148 men undergoing UDS in the presence of a 4 Fr manometer and 10 Fr filling catheter a significant reduction in maximum urinary flow rate was observed. This effect was greatest in those with a normal UDS (47% reduction in maximum flow rate) but consistent for men with BOO (30%) and those with detrusor underactivity (37%). These data suggest that the presence of a 4 and 10 Fr catheter assembly significantly alters voiding conditions resulting in erroneous measurements of uroflow parameters. The magnitude of the difference in maximum urine flow rate was greater than expected from previous reported series and could potentially lead to inaccurate diagnoses following pressure flow studies. We speculate that the observed differences may be

caused by a direct “obstructing” effect of the catheters or by a reduction in bladder contractile strength following non-physiological filling. The men in Group 1 with normal UDS had the highest relative reduction in urine flow rate and the reason for this is unclear. Perhaps the group with BOO were affected least because of their capacity to void at higher pressure. Both the normal (Group 1) and detrusor underactivity group (Group 3) had significantly lower voiding pressures and a greater relative reduction in maximum flow recorded during UDS than the BOO group (Group 2).

In contrast Group 4 who underwent UDS using an 8 Fr dual lumen urethral catheter did not show significant differences in maximum urine flow rate measured with ($Q_{max.p}$) and without (Q_{max}) the catheter in situ. These data imply that the use of a smaller urethral catheter assembly enables more accurate measurement of uroflow parameters and potentially results in fewer diagnostic errors. The large differences seen within Groups 1-3 are likely to be attributable to catheter size as both free and UDS urine flow rate measurements were very similar in Group 4 using a smaller 8 Fr dual lumen catheter. The higher values of voided volume recorded during UDS across all patient groups reflect the established difference between cystometric and functional bladder capacity.

Concluding message

Our findings are in line with previous work suggesting that smaller calibre urethral catheters do not cause a significant obstructive effect during voiding. If a two catheter assembly is to be used for UDS then these data would suggest removal of the larger filling catheter prior to the pressure flow study in order to minimise inaccuracy in the measurement of uroflow parameters. This may however result in technical errors due to line manipulation and risk of voiding very small catheters (4 Fr and below). This study supports the recommendation contained in the International Continence Society’s Good Urodynamic Practice document that dual lumen catheters are used for UDS.

Specify source of funding or grant	**None Needed**
Is this a clinical trial?	**No**
What were the subjects in the study?	**HUMAN**
Was this study approved by an ethics committee?	**No**
This study did not require ethics committee approval because	**Retrospective Review**
Was the Declaration of Helsinki followed?	**Yes**
Was informed consent obtained from the patients?	**No**