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LACK OF DIFFERENCE IN VOIDING PRESSURE MEASUREMENTS BETWEEN AMBULATORY AND CONVENTIONAL CYSTOMETRY

Hypothesis / aims of study

Several reports have highlighted intra-individual differences in flow and pressure measurements made during ambulatory urodynamic monitoring (AUM) compared with conventional cystometry (CMG)(1,2). In general voiding pressure measurements ($p_{det.Qmax}$) are stated to be significantly higher when recorded during AUM and this is associated with lower voided volume and higher maximum flow rate (Q_{max}) compared to measurements during CMG (1,2,3). Much of the work in this area was performed in the 1990's with innovative equipment and in some cases (3) without the simultaneous measurement of urine flow. With the advancement of urodynamic technology over the last decade we have re-investigated the relationship between measurements made during conventional CMG and those from AUM using a recently refined ambulatory system with simultaneous pressure-flow recording. The aim of this study was to compare urodynamic measurements made during conventional cystometry with those from AUM using modern ambulatory equipment.

Study design, materials and methods

All women attending from 2002 to January 2010 for both conventional and ambulatory urodynamics as part of the investigation of urinary symptoms were included in this study. Both CMG and AUM were performed according to International Continence Society Guidelines; specifically the ambulatory system involves the use of a 6 Fr urethral solid state pressure transducer line in contrast to conventional studies performed using a 4 Fr manometer catheter and a 10 Fr filling catheter in situ. The ambulatory recording system samples data at 1 Hz to digital memory for later transfer to a PC computer for detailed analysis. The recorder also records urine leakage using an Exeter electronic nappy and during voiding is connected to a load cell flowmeter to capture voided volume and flow rate. A display on the recorder allows the balance of pressure lines to be checked.

Exclusion criteria were a study separation of more than 24 months, failure to omit uroselective medications, previous pelvic surgery and previous intravesical botulinum toxin. In addition those women undergoing video fluoroscopy as part of their conventional study were excluded due to the possible effect of radiological contrast on urine flow. All urodynamic parameters were recorded and measurements from AUM were averaged if more than one fill-void cycle was recorded. The conventional and ambulatory measurements were then compared using paired Student's t-tests.

Results

30 women with a mean (s.d.) age of 50 (14) years (range 14 – 73 years) met the pre-stated inclusion criteria. The major indication for investigation was mixed urinary incontinence and there was a mean (s.d.) study separation of 11 (6) months with CMG preceding AUM in most cases. Results obtained are tabulated below (Table 1). The significant difference in bladder pressure at the end of the filling phase reflects the practice of filling patients in the supine position during conventional cystometry. Although flow rate was significantly higher during AUM, there was no difference in detrusor pressure recorded by both techniques at end of filling and at the time of maximum flow, As expected voided volume was higher during conventional cystometry reflecting the established difference between cystometric and functional bladder capacity; this was not statistically significant.

Table 1 ***Comparison of urodynamic measurements using conventional and ambulatory techniques***

	CONVENTIONAL (n = 30)	**AMBULATORY (n =30)**	P value (paired Students t-test)
p_{abd} end filling (cmH_2O)	18.21 ± 9.16 Supine	36.83 ± 11.57 Standing	P = <<0.05
p_{ves} end filling (cmH_2O)	24.06 ± 11.03 Supine	41.97 ± 8.35 Standing	P = <<0.05
p_{det} end filling (cmH_2O)	5.91 ± 5.19 Supine	4.79 ± 13.22 Standing	P = n.s.
$p_{det.Qmax}$ (cmH_2O)	27.75 ± 11.99 Sitting	28.38 ± 17.98 Sitting	P = n.s.
Q_{max} (mls^{-1})	14.98 ± 8.19	20.38 ± 8.64	P <<0.05
p_{detmax} (cmH_2O)	41.66 ± 21.19	41.35 ± 19.79	P = n.s.
voided volume (ml)	387.50 ± 145.52	327.98 ± 123.33	P = n.s. (0.06)

Interpretation of results

In contrast to previous studies (1,2,3) we did not find significant differences in detrusor pressure measured during conventional compared to ambulatory urodynamics. Furthermore the level of agreement between the two techniques in this study was striking; the respective detrusor pressures at the end of filling and at maximum flow were within 2 cmH_2O when conventional and ambulatory measurements were compared. This may be due to the use of improved ambulatory equipment including hardware and software or the result of

increasing levels of expertise using the AUM technique. Previous work has highlighted the difficulties in detrusor pressure measurement during AUM in the absence of urine flow data and specifically commented on the inability to separate voiding detrusor contractions from after-contractions. Much of the work describing a significant discrepancy between detrusor pressure measured using ambulatory compared to conventional urodynamics includes recordings that did not have simultaneous uroflow data. It may be that the use of more modern equipment has resulted in greater concordance between these two urodynamic modalities.

Our finding of significantly higher values of Q_{max} recorded during AUM is intriguing and in line with previous work (1,2,3). It may partly reflect smaller urethral line calibre used during AUM with lack of need for a filling line.

Concluding message

In our study voiding pressure ($p_{det.Qmax}$) recorded during ambulatory urodynamic monitoring appears identical to that recorded by conventional cystometry in women with mixed urinary incontinence. This requires further validation in other groups of patients with lower urinary tract symptoms.

References

1. J Urol 1996:155(2);506
2. BJOG 1996:103 (5);434
3. Br J Urol 1994:73 (3);242

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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	**Not necessary**
Was the Declaration of Helsinki followed?	**Yes**
Was informed consent obtained from the patients?	**Yes**