

WORKSHOP A3 — AMBULATORY URODYNAMIC MONITORING

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VARIABILITY OF TEST CONDITIONS

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There are several conditions which can vary considerably in performing ambulatory urodynamic monitoring (AUM). Some of these are critical for the interpretation of the test and in making the final diagnosis, so that there is always the risk that the same examination can come to different conclusion according to the modalities it was performed.

To further elucidate the problem we made a survey among different urodynamic laboratories world-wide, inquiring the various modalities employed to conduct the studies.

A 17-question questionnaire was mailed to 55 centres, 22 of which answered. Most of them were urological centres (17), with a minority being gynaecological (3) or paediatric Urology (4).

The first question concerned the indications to the test: the answers were 79 % to demonstrate detrusor overactivity; 54% in neurogenic voiding dysfunction; 54% to investigate complex, mixed urinary incontinence in the female.

In 70 % AUM is performed only after a non-diagnostic standard urodynamic investigation.

43 % of the labs do not give any prescription to the patients in preparation to the test.

In 22/24 centres microtip catheters are used to measure pressures.

Regarding the variables measured, besides bladder, abdominal and detrusor pressure, measured by everybody, urethral pressure is measured in 46% of the centres and 62% do also the pressure flow study. In 21% of the centres a suprapubic approach to measure P_{ves} is used always or in particular cases (children).

In 3/24 centres P_{abd} is measured in sites different from rectum (vagina or pre-vesical space).

46 % ask the patients to drink a standardised amount of liquids to force the diuresis.

A bladder diary is always used during the test.

At 21 % of the centres the test duration is 24 hours (3-6 hours in the remaining cases).

Antibiotic prophylaxis is used always in 42%, in some occasions in 41% and never in 17 % of the centres.

25 % of the centres require a minimum of 25 cmH₂O amplitude to define an involuntary contraction.

These results confirm that there is a large variability of the test conditions, some of which may affect the interpretation of the AUM.

REVIEW OF THE ICS STANDARDISATION

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Standardisation of Ambulatory Urodynamic Monitoring: Report of the Standardisation Sub-committee of the ICS for ambulatory urodynamic studies. Ernst van Waalwijk van Doorn, Kate Anders, Vik Khullar, Sigurd Kul-seng-Hanssen, Francesco Pesce, Andrew Robertson, Derek Rosario, Werner Schäfer. *Neurourology and Urodynamics* 2000; 19: 113-125.

GOOD URODYNAMIC PRACTICE: QUALITY CONTROL IN AMBULATORY STUDIES

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In principle the same strategies and quality criteria should be applied in all forms of urodynamic studies, conventional or ambulatory. However, as usually it is not possible to control data quality during the study, we should adapt our strategy and perform an even more stringent signal plausibility and quality control retrospectively. No doubt, the future should be a computerized expert system with inherent automated quality control. Until then we are forced to prepare the set-up and test all signals even more carefully and critically before the study is started and be aware of common artefacts at the time of data analysis.

The common use of microtip transducers will need consideration and possibly corrections at the time of data analysis because it will be difficult to ensure the correct reference level of the transducers. Therefore, it is even more important to comply with the ICS standard for zero pressure as the atmospheric pressure and not as the initial pressure in bladder or rectum at start of recording. This at least should help to avoid that signals become negative during the study. Whenever pressure values from ambulatory recording are reported the exact circumstances and techniques should be made clear.

The importance of pattern analysis then becomes even more important in ambulatory recordings.

However this can follow directly the same criteria as conventional studies. Definitely it is even more important to understand, that good studies are easy to interpret.

See the ICS guidelines of "good urodynamic practice, GUP": **NEUROUROL URODYNAM 21:261-274, 2002.**

TIPS FOR SUCCESSFUL CLINICAL TESTING

Stefano Salvatore

A report on standardisation of Ambulatory urodynamic monitoring (AUM) has recently been published by a subcommittee of the International Continence Society[1]. This will be of great importance allowing the comparison of different experiences from different Units. A further improvement in the execution of AUM can be easily achieved by following simple but important rules either before or during or after the test.

- Before the test

It is important to ask the patient to empty her bowel before the test and to wear comfortable and separate clothing. Verbal and written information should be given about the procedure which should last at least 4 hours. In fact patient compliance is essential. Urinary tract infection should always be excluded. Transducers should be stored in a moist environment, then sterilised in Cidex and rinsed in sterile water before insertion.

- During the test

Before the insertion the catheters should be zeroed to air to avoid the recording going out of range. Both bladder transducers are inserted into the bladder to exclude artefacts during the interpretation of the traces at the end of the test. The rectal catheter, which is covered by a silicone coating, is inserted into the rectum covered by a non-lubricated condom to avoid contamination. Both the catheters are taped to the inner thigh close to the labia and then brought forward, over the abdomen and arranged to be accessible thorough the clothing. Considering a daily fluid intake of 2 litres, patients should be asked to drink 180ml of fluid every 30 minutes. Urinary leakage should be detected either by means of a Uriloss pad or of a temperature detector or of electrical conductance.

It is essential that the patient fill in the diary in a proper way in order to provide information of activity during the test. For the time of each single event the patient should not use her own watch but the timer on the ambulatory box. Patient should always be instructed to connect the ambulatory box to the flowmeter when she needs to empty her bladder. When a flowmeter is not available or is not included in the ambulatory urodynamic equipment, patient should press an event maker button once on entry to a toilet, and once again when void starts. At least once an hour the patient needs to be checked on-line. If the patient is uncomfortable or if the test becomes unacceptable the patient should be able to easily contact the coordinator. At the end of a 4-hour test, with a full bladder, the patient is asked to perform a series of provocative manoeuvres to improve diagnostic yield, such as 10 coughs, 10 star jumps, hand-washing or heel-bouncing

- After the test

At the end of the test it is important to clean the catheters thoroughly. The recordings are downloaded according to the manufacturer's instruction. The traces, together with the diary, should be interpreted by the test coordinator with the patient present. For a better interpretation the suggested trace compression should be 4minutes/page. Before discharging the patient she should be warned about the possibility of a stinging sensation in her urethra and bladder for up to 12 hours. It should therefore be recommended to maintain a good amount of fluid intake and to seek medical help if symptoms of cystitis appears or the urine become offensive. Antibiotic prophylaxis should be given in case of diabetes, known residuals or reflux or when a patient has a history of recurrent urinary tract infection.

van Waalwijk van Doorn E, Anders K, Khullar V, Kulseng-Hanssen S, Pesce F, Robertson A, Rosario D, Schäfer W. 2000. Standardisation of ambulatory urodynamic monitoring: report of the standardisation subcommittee of the International Continence Society for ambulatory urodynamic studies *Neurourol Urodyn* 19: 113-125

INDICATIONS FOR AMBULATORY MONITORING

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Standard cystometry is recognised as an important tool in the management of patients with lower urinary tract dysfunction. It is, however, an unphysiological test which does not provide a diagnosis in a proportion of patients. Ambulatory urodynamic monitoring has been developed to overcome some of these limitations. There have been a number of controversial issues surrounding ambulatory monitoring and its role in the investigation of patients with lower urinary tract symptoms has been unclear¹. The publication of the International Continence Society standardisation report concerning ambulatory monitoring has clarified some of these issues. The standardisation report addresses many aspects of ambulatory monitoring including terminology, methodology, analysis and indications for referral².

Ambulatory monitoring is not normally considered to be a first-line investigation in view of the controversies that have surrounded it. The current consensus view, based on the standardisation report, is that there are four main groups of indications for ambulatory monitoring. These are the further investigation of lower urinary

tract symptoms where standard cystometry has not provided an explanation, situations where standard cystometry would be unsuitable, the investigation of neurogenic lower urinary tract dysfunction and evaluation of therapies².

Ambulatory monitoring is acknowledged to demonstrate detrusor overactivity in more patients who describe urgency than standard cystometry³. It is therefore a useful additional tool in the further investigation of patients complaining of urgency where a definitive diagnosis is required. It may also be indicated in women complaining of stress incontinence where no leakage was revealed during standard cystometry⁴.

Ambulatory monitoring may also be indicated in situations where standard cystometry could be considered unsuitable. These situations include the investigation of men who have difficulty in voiding in public, so called 'bashful voiders'. 'Bashful voiders' are likely to have difficulty in voiding during standard cystometry, thus making the accurate recording of detrusor pressure at maximum flow rate impossible. During ambulatory monitoring these men are able to void in a more discrete environment enabling pressure/flow studies to be performed⁵. Ambulatory urodynamics has also proved useful in the investigation of children and patients who have had neobladders or cystoplasties.

Neurogenic lower urinary tract dysfunction is another situation where ambulatory monitoring may be useful⁶. Filling speeds during standard cystometry are known to affect vesical pressure in patients with neuropathic bladders. The monitoring of bladder function while the bladder is filling at a physiological speed may give a better indication of the behaviour of the bladder during 'real life'.

The evaluation of therapies, in particular drugs for the management of detrusor overactivity, can also be well served by ambulatory monitoring⁷.

Ambulatory monitoring can thus be seen to be a useful additional tool in the management of patients with lower urinary tract dysfunction. Its use is best confined as a second-line investigation in the situations outlined above.

References:

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- 7 Rosario DJ, Smith DJ, Radley SC, Chapple CR. Pharmacodynamics of anticholinergic agents measured by ambulatory urodynamic monitoring: a study of methodology. *Neurourol Urodyn* 1999; 18:223-33.

WHAT IS NORMAL DETRUSOR ACTIVITY DURING STORAGE ?

Derek Rosario

AUM has been shown by several investigators to be more sensitive than conventional urodynamics in detecting detrusor activity felt to be responsible for a patient's symptoms. Findings on AUM have also been shown to correlate better with symptoms of bladder overactivity than conventional studies. However, detrusor activity occurs on AUM in up to 69% of so-called normal volunteers. This is hardly unexpected, as almost everyone at some time has experienced an episode of urinary urgency. AUM has shown us that the detrusor is an active organ. On the basis of reported symptoms during AUM, electronic monitoring of leakage and post-processing of pressure data, accompanied by assiduous in-study markers, one is able to characterise the type of activity seen in normal volunteers and in symptomatic patients. Simple parameters such as amplitude, duration and volume at occurrence can separate 'normal' from 'abnormal' activity with reasonable certitude. A system of classification of detrusor activity during AUM is suggested. What remains is to show that abnormal activity detected on AUM has implications for outcomes following treatment.

FUTURE DIRECTIONS

Vik Khullar

Ambulatory urodynamics still has to be developed to its full potential for measuring urethral pressures and studying the interaction of the bladder and urethra. Ambulatory may be developed as a tool for measuring the severity of detrusor instability as well as being used in drug studies to compare the efficacy of different medications.

The use of drinking and how it alters bladder function could be assessed with ambulatory urodynamics as well as determining changes in the upper tracts.