

## **MOVEMENT ARTEFACT DURING URETHRAL PRESSURE MEASUREMENT: IS IT A PROBLEM?**

### Hypothesis / aims of study

Current techniques for measuring resting urethral pressures in women have an inherent susceptibility to movement artefact. This is due to the small size of the microtransducers used, and the narrow pressure area monitored. Small catheter movements can cause a fall in recorded pressure which is indistinguishable from a true urethral relaxation. This raises questions over the validity of previous studies of urethral behaviour using this technique, as movement artefact cannot be excluded from the results.

As part of our work on improving the reliability of urethral pressure measurement we have tested a catheter modification that is able to differentiate movement artefact from true urethral relaxations. We are currently using this in clinical practice to assess the prevalence of movement artefact in routine urethral pressure measurement, and to see if this has any impact on the interpretation of the results.

### Study design, materials and methods

Our modified catheter consists of four catheter mounted micro-transducers. One is tip-mounted to record intravesical pressure. The other three are positioned 6cm proximally to record urethral pressure. Urethral pressure is measured with a standard technique. A urethral pressure profile is performed with the microtransducers orientated at 9 o'clock in the urethra. The point of maximal urethral pressure (MUP) is identified and the microtransducers returned to this point to monitor pressure over a period of minutes. We position the middle of the three urethral sensors at the MUP, leaving the two outer sensors to record the slightly lower pressures adjacent to this. If the catheter moves, one of the outer sensors should move towards the MUP, showing a rise in recorded pressure. The other two sensors should move away from the MUP, and so show a fall in recorded pressure. In contrast, a true urethral relaxation will show a pressure fall on all three sensors.

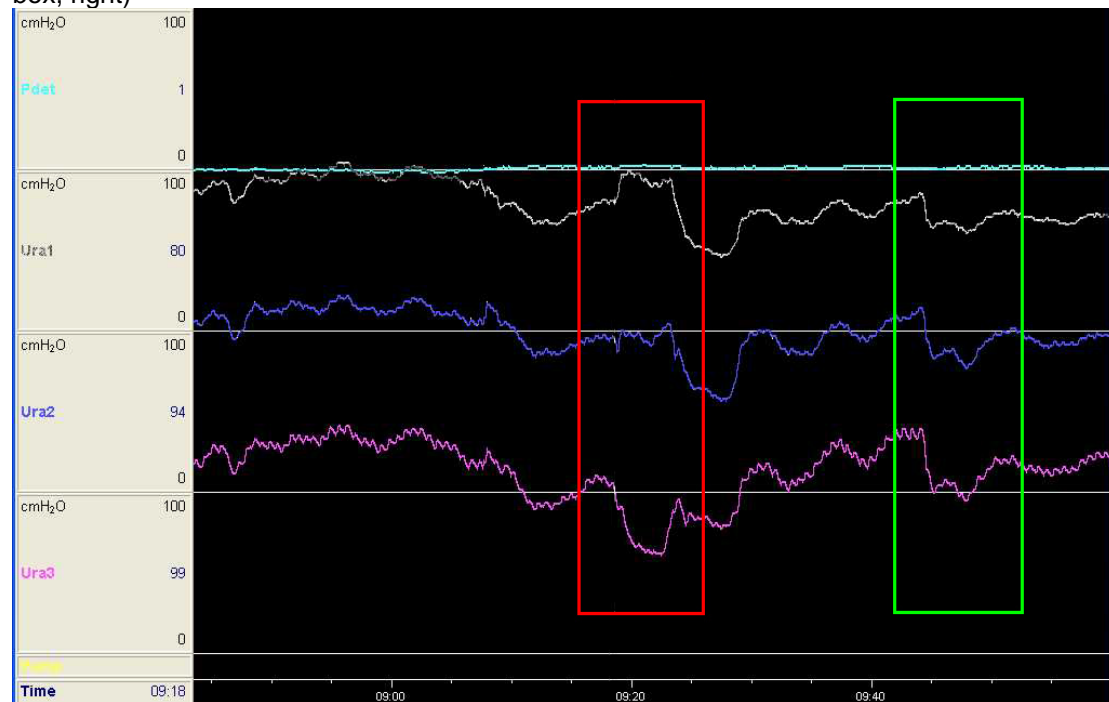
We have tested this catheter in adult female patients undergoing urodynamic studies for symptoms suggestive of detrusor overactivity. Urethral pressure was recorded for five minutes. During this time a deliberate catheter manipulation was performed to create a movement artefact to confirm the response pattern. Traces were then retrospectively reviewed to establish the frequency of this artefact pattern over the recording period.

### Results

The results from our first twelve patients are included in this abstract. Further work is ongoing. The mean age of the patients was 53 years (range 35-70). Seven patients had detrusor overactivity (DO), two with co-existing stress incontinence (USI). Five of these patients had traces with urethral pressure variations. Two patients had USI alone, neither with urethral pressure variations. Three patients had neither DO nor USI. Two of these had urethral pressure variations.

In all patients deliberate catheter manipulation produced a pattern of pressure change as described in the methodology. Simultaneous pressure drops across all three sensors, suggestive of true relaxations were seen in six patients. These were clearly distinct from the pattern produced by manipulation (Figure 1).

**Figure 1:** Showing a urethral pressure tracing from a patient with urethral relaxations. The effect of catheter movement (red box, left) is clearly distinct from true relaxations (eg green box, right)



Review of all traces did not show any reproduction of the artefactual pattern of pressure change. All variations in pressure were simultaneous across the three sensors, suggesting true urethral relaxations.

#### Interpretation of results

Our modified catheter, with three urethral pressure sensors, is able to identify artefactual falls in recorded urethral pressure caused by small catheter movements. It can also differentiate these from true relaxations. Analysis of our first group of patients showed no evidence of significant artefact during standard urethral pressure monitoring.

#### Concluding message

Although current techniques of urethral pressure measurement are potentially susceptible to confounding movement artefact, they appear not to be a significant problem in clinical practice. Previously published results using this technique are therefore likely to be valid.