

## SUMMARY

In the 1980s and 1990s, a method for direct measurement of pressure and cross-sectional area in women and men was developed. It was successful in terms of obtaining meaningful results in several studies. But the technique was never implemented in the clinical setting because of technical limitations. In 2005, Urethral Pressure Reflectometry (UPR) was introduced as a new technique in female urodynamics. The technique has been shown to be more reproducible than conventional urethral pressure profilometry, when measuring incontinence in women. In 2010 it was also introduced as a new measuring technique in the anal canal.

The two studies comprised in this thesis, adds a new and interesting technique to the field of male urodynamics. For the first time, sound waves have been used to measure pressure and cross-sectional area simultaneously, directly in the prostatic urethra.

The aims of this thesis were:

### *Study I*

In a group of men with complains of lower urinary tract symptoms (LUTS) to test: 1) the feasibility of UPR when used in the resting prostatic urethra including the withdrawal technique of the catheter from the bladder to the bladder neck, 2) the significance of the tissue response of the prostatic urethra with regard to the velocity of the measurements and 3) the time interval between the different measurements in relation to the resting state of the urethra.

### *Study II*

In a group of men without bothersome LUTS to describe: 1) the pressure, elastance and hysteresis with UPR, 2) to compare the findings to regular urodynamic investigation in the same group of men.

### *Ad study I*

10 men were examined with UPR and a standardized method for future measurements with the method was developed.

## *Ad study II*

18 men were examined with UPR and standard urodynamic evaluation. All UPR parameters increased from the bladder neck to the sphincter region. Seven men were obstructed according to pressure-flow (PQ) studies, but with no significant differences in any other standard urodynamic parameters. The loss of energy during measurements in the external sphincter region was significantly lower in the obstructed group. The score from the visual analog scale was significantly lower with PQ compared to UPR. Nine men had slight bleeding from the urethra during measurement with UPR.

### Conclusion:

- 1) UPR has shown to be feasible in the male urethra, providing results compatible with previous techniques.
- 2) The described methodology seems to be robust as to changes in velocity and time interval of dilations (inflation) of the urethra.
- 3) UPR may provide objective parameters of the type and level of obstruction in the prostatic urethra.
- 4) To solve the technical limitations and side effects experienced in the first two trials, the catheter needs further remodelling with a more smooth transition zone between the PVC tube and the polyurethane-bag. This will be corrected before moving on with future trials. Another, but probably more distend remodelling, is to be able to reverse the sound waves, so they originate from the bladder neck and propagate towards the sphincter region.
- 5) Studies of reproducibility are needed to evaluate the clinical reliability of measurements.
- 6) Studies on healthy volunteers and patients with lower urinary tract symptoms and/or Benign prostatic obstruction are needed to determine if UPR can provide a new tool to diagnose local pathology (changes in mechanical properties) of the urethra and hence make possible a more specific and less invasive treatment of obstruction as a supplement in men already diagnosed with obstruction by PQ.
- 7) A future area of interest are studies on the sphincter region in men before and after retropubic radical prostatectomy to further evaluate the use of UPR and possibly the pathology and diagnostic factors relating to post radical prostatectomy incontinence.