123

Authors: F. Schmidt, PY Shin, JC. Djurhuus, CE Constantinou
Institution: Aarhus University & Stanford University
Title: NORMAL MALE MICTURITION USING AMBULATORY URODYNAMICS

Aims of Study.

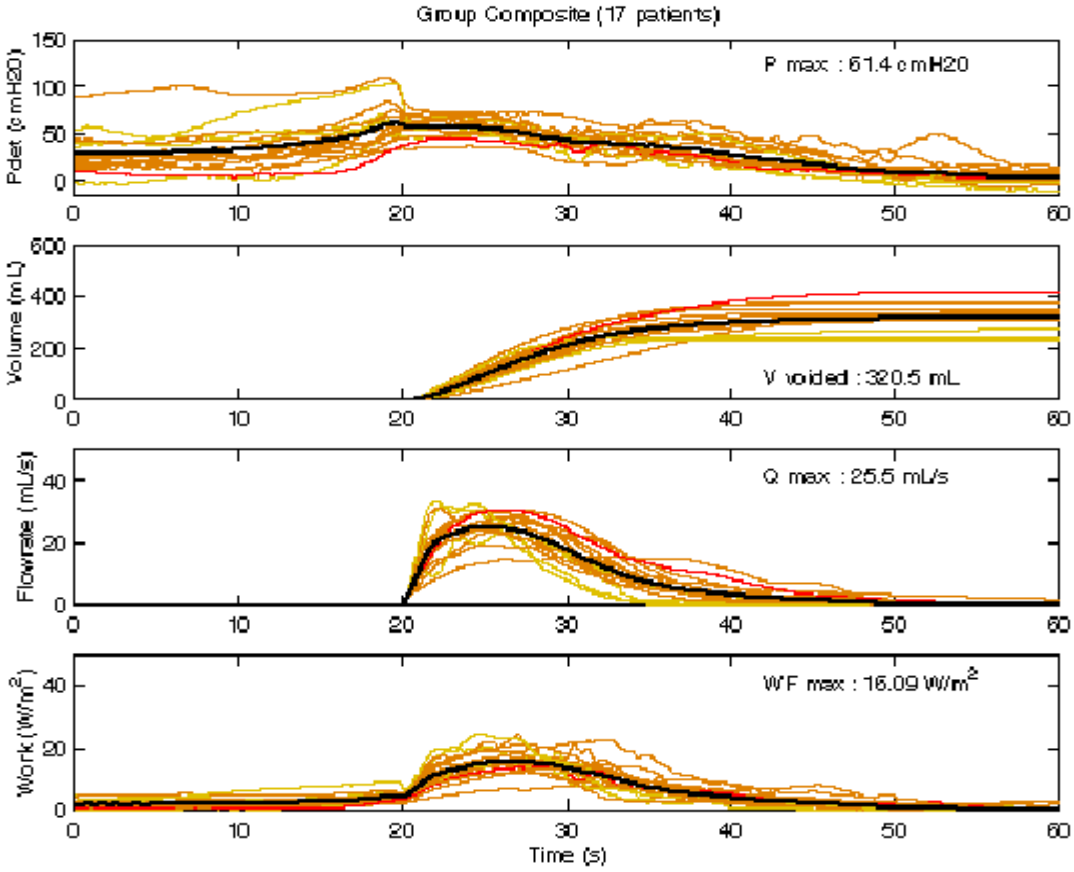
Micturition of asymptomatic male volunteers, can be a useful standard to make comparisons with patients complaining of voiding dysfunction. The validity of such a standard is based on the evident need to obtain numerical parameterization of the commonly used values of maximum flowrate [Qmax] and pressure [Pmax]. While parameters such as Pmax and Qmax are a useful summary of the voiding sequence, more functional information concerning the mechanism of micturition may be obtained by a more complete analysis of the configuration and temporal sequence of the P/Q curves. Analysis of the information contained in these curves in terms of bladder contractility can therefor provide a more accurate descriptor of voiding. In the present study, we replicate the basic experimental conditions that reasonably approach normal voiding function as micturition using physiologically produced urine by the kidneys, measured over time intervals that representing normal bladder filling. The evaluation of a number of consecutive micturitions at bladder volumes was determined by the circadian rhythm of the subject and measurement of bladder pressure was done without impeding the flow of urine through the urethra with a catheter. The later requirement is theoretically important to characterize the fundamental P/Q relationship and accurately derive bladder contractility.

Methods.

Ambulatory urodynamics were done on 17 asymptomatic male volunteers mean age 25.79 (21-31) years and weighing 75.5Kg(63-95) using UPS2020 system. Bladder pressure was monitored via a suprapubic catheter and abdominal pressures via a rectal balloon. Average duration of each monitoring period was 20.8±1.4 hours where 7.1±0.8 consecutive micturitions were obtained. Bladder contractility, W was calculated using Hills equation (1). Detrusor pressure, and flowrate curves from each subject were identified and consecutive filling and voiding phases were averaged over the entire period of monitoring by using the onset of micturition as a time marker. Subsequently the composite average of pressure, flowrate, cumulative volume, and contractility of all subjects was also evaluated to calculate the group average of all subjects. In addition the composite values of P/Q, W/Q, and urethral resistance were similarly computed and graphically presented. Numerical values given are M±SE.

Results

The figure below shows the group composite of pressure/flow characteristics of the 17 subjects evaluated. The dark curve is the composite average of all micturitions measured in the study. Voiding curves show that Pmax was 61.8±4.0 cmH_2O and was attained immediately prior to the detection of urine flow. Upon the detection of voiding, detrusor pressure decreased monotonically until the termination of voiding. Qmax was 25.5±1.1 ml/sec and detrusor contractility was 16.1±0.10 W/m^2 for an average voided volume of 320±12 ml. Temporal sequence analysis shows that Pmax was attained prior to the onset of voiding and was equal to isometric pressure. As indicated by the figure Qmax is attained at approximately 6.6±0.3 sec after the initiation of voiding. Detrusor pressure at the point of Max flowrate was 47 ±2.2 cm H2O.



Micturion recording illustrating the mean values of Detrusor Pressure, Volume Micturition phase illustrating the mean values of Pmax, Volume micturated, flowrate, and work done by the detrusor. Record synchronised to show parameters 20 sec. Prior to the onset of flow. Each line represents the avarage value per subject. Solid lirepresents the mean of all subjects evaluated.

Conclusions.

It is concluded that the urodynamic values in Pmax and Qmax are significantly different from the standardization reports of normal values (2). Furthermore analysis of the temporal sequence of detrusor pressure and flow provides strong evidence of the need to redefine the configuration of normal voiding. Finally the relationship between detrusor pressure and urine flow, reported in urodynamics studies using urethral catheterization, are indeed different from those measured from subjects having unimpeded flow.

1.Neurourol. Urodyn 10:47-52 (1991)

2 Neurourol Urodyn 19:484-485 (2000)

This study has received support from Medtronic Inc.

1. Sacral nerve stimulation for treatment of refractory urinary urge incontinence. Sacral Nerve Stimulation Study Group. J Urol 162(2) 1999: 352-7.
2. Efficacy of sacral nerve stimulation for urinary retention: results 18 months after implantation. J Urol 165(1) 2001: 15-9.

Sacral neuromodulation in the treatment of urgency-frequency symptoms: a multicenter study on efficacy and safety." J Urol 163(6) 2000: 1849-54.