

Urodynamiikan teoria ICS guidelinet

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Naistentautien ja synnytysten erikoislääkäri
Urologiksi erikoistuva lääkäri

Good Urodynamic Practices

- Schäfer W, Abrams P, Liao L, Mattiasson A, Pesce F, Spangberg A, Sterling AM, Zinner NR, van Kerrebroeck P. 2002. Good Urodynamic Practices: Uroflowmetry, Filling Cystometry, and Pressure-Flow Studies. Neurourol. Urodynam. 21:261-274,2002.
- The first report of the ICS on the development of comprehensive guidelines for Good urodynamic Practice for the measurement, quality control, and documentation of urodynamic investigations

A Good Urodynamic Practice

- A clear indication for and appropriate selection of, relevant test measurements and procedures
- Precise measurement with data quality control and complete documentation
- Accurate analysis and critical reporting of results

Formulate the 'urodynamic question'

- Careful history, physical examination, and standard urological investigations
- The patient's recording of micturitions and symptoms on a frequency volume chart (bladder diary), and repeated uroflowmetry with determination of post-void residual volume

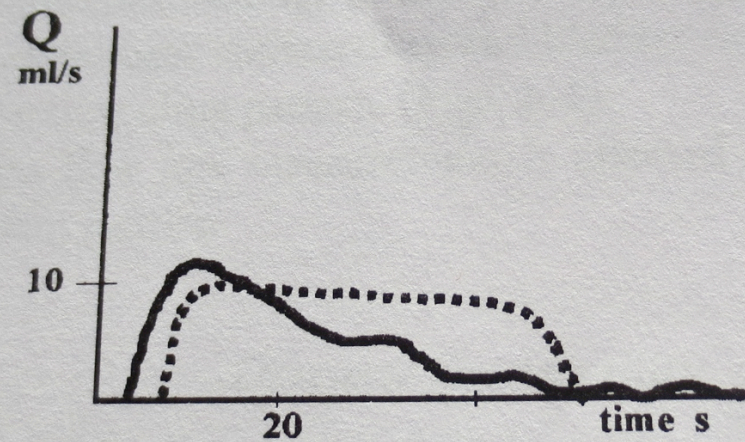
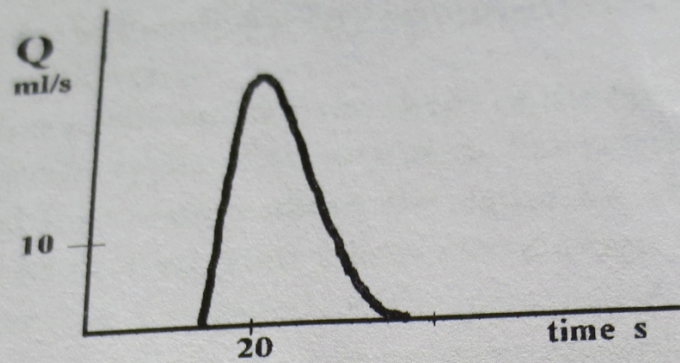


Fig. 1. Typical normal flow (**top**), constrictive flow (**bottom**, dotted line), compressive flow curve (bottom).

Recommendations for Uroflowmetry

- In order to facilitate the recording of urine flow rate and pattern recognition of flow curves, it is recommended that graphical scaling should be standardized as follows:
- One millimeter should equal 1 s on the x-axis and 1 ml/s and 10 ml voided volume on the y-axis.

Recommendations for Uroflowmetry

- In order to make electronically-read $Q_{\max}$ values more reliable, comparable, and clinically useful, we recommend internal electronic smoothing of the flow rate curve. It is recommended that:
- A sliding average over 2 s should be used to remove positive and negative spike artifacts.
- Only flow rate values, which have been 'smoothed', either electronically or manually, should be reported.

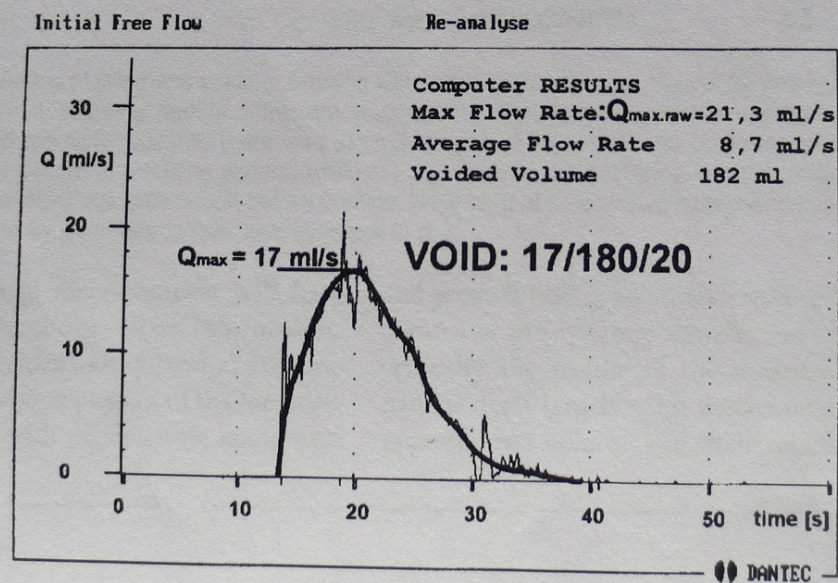
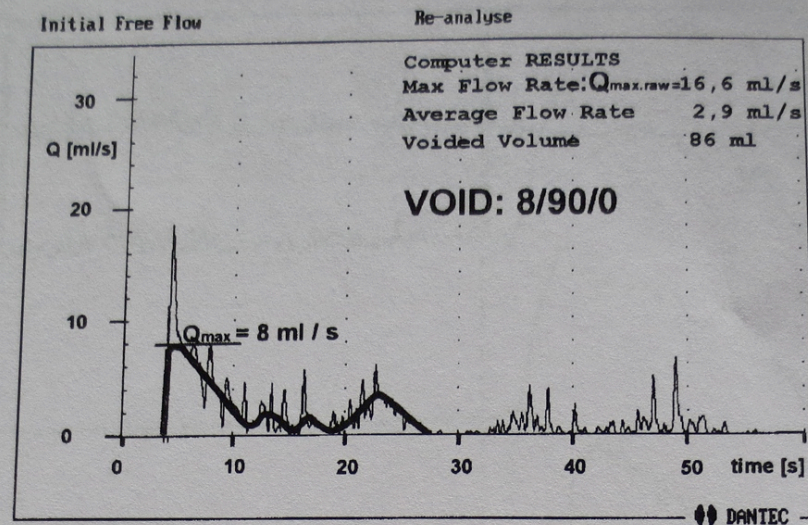


Fig. 2. Exclusion of artifactual spikes in the flow curve, $Q_{\max, \text{raw}}$, and determination of a clinically relevant maximum flow rate, $Q_{\max}$, by manual smoothing. The results from uroflowmetry should be reported in the standard format: $Q_{\max}/V_{\text{void}}/V_{\text{res}}$.

Recommendations for Uroflowmetry

- For the documentation of the results of uroflowmetry, the following recommendations are made:
- Maximum (smoothed) urine flow rate should be rounded to the nearest whole number (a recording of 10.25 ml/s would be recorded as 10 ml/s)
- Voided volume and post residual volume should be rounded to the nearest 10 ml (a recording of a voided volume of 342 ml would be recorded as 340 ml)

Recommendations for Uroflowmetry

- The maximum flow rate should always be documented together with voided volume and post void residual volume using a standard format:
VOID: Maximum Flow Rate/Volume Voided/Post Void Residual Volume.

Recommendations for Invasive Urodynamics

- A good urodynamic investigation should be performed interactively with the patient. It should be established by discussion with the patient that the patient's symptoms have been reproduced during the test
- There should be continuous and careful observation of the signals as they are collected, and the continuous assessment of the qualitative and quantitative plausibility of all signals

Recommendations for Invasive urodynamics

- Artifacts should be avoided, and any artifacts that occur should be corrected immediately. It is always difficult and is often impossible to correct artifacts during a retrospective analysis. Furthermore, it is more time consuming than if the signals are continuously observed and tested at regular intervals and artifacts recognized during the urodynamic study and corrected.

Recommendation for Invasive urodynamics

- Invasive urodynamics should not be performed without precise indications and well-defined 'urodynamic questions' that are to be answered by the results of the urodynamic study.

Measurement of Intravesical and Abdominal Pressure

- It is recommended that there is strict adherence to the ICS standardization of zero pressure and reference height. Only then can pressure recordings be compared between patients and centers.
- Zero pressure is the surrounding atmospheric pressure.
- The reference height is defined as the upper edge of the symphysis pubis.

- It is recommended that for intravesical and abdominal pressure recording external transducers connected to fluid-filled tubings and catheters be used. If microtip or air-filled catheters are used, any deviation from standard zero and reference level should be minimized and taken into account at the time of data analysis

Urodynamic Catheters

- For the measurement of intravesical pressure and for bladder filling, the standard catheter for routine urodynamics is a transurethral double-lumen catheter
- The use of a rectal balloon catheter is recommended for the measurement of abdominal pressure, p_{abd}

Equipment Recommendations

- Three measurement channels, two for pressure and one for flow
- A display (on printer and/or monitor) and secure storage of three pressures (p_{abd} , p_{ves} , p_{det}) and flow (Q) as tracings against time
- Infused volume and voided volume may be shown graphically or numerically
- On-line display of pressures and flow, with adequate scale and resolution; scales must be clearly given on all axes; no information should be lost electronically when tracings go off-scale on display
- Possibilities to record standard information about sensation and additional comments (event recording)

Technical specifications recommended

- Minimum accuracy should be ± 1 cm H₂O for pressure and $\pm 5\%$ full scale for flow and volume
- Ranges of 0-250 cmH₂O, 0-25(50) ml/s, and 1000 ml for pressure, flow, and volume, respectively
- The software must ensure that no information for pressures up to 250 cm H₂O and for flow rates up to 50 ml/l is lost internally even when not displayed and that off-scale values are clearly identified

- An analog/digital (A/D) frequency of 10 Hz per channel as the lower limit for pressure and flow
- A higher frequency (minimum 20 kHz) is necessary for recording EMG
- Calibration of all measurements should be possible
- During recording and for analysis, minimum scaling for pressure be of 50 cmH₂O per cm, for flow 10 ml/s per cm, and for time axis 1 min/cm or 5 s/mm during filling and 2 s/mm during voiding

Recommendations for pressure recordings

- Resting values for abdominal, intravesical, and detrusor pressure are in a typical range (p_{ves} and p_{abd} is supine 5-20 cm H₂O, sitting 15-40 cm H₂O, standing 30-50 cmH₂O, p_{det} 0-6 cmH₂O 80 % of cases)
- The abdominal and intraveical pressure signals are 'live', with minor variations caused by breathing or talking being similar for both signals; these variations should not appear in p_{det}

- Coughs are used to ensure that the abdominal and intravesical pressure signals respond equally. Coughs immediately before voiding and immediately after voiding should be included.

Urodynamic computer software

- When analytical urodynamic software is used to perform data analysis according to any published concept, the source of the software should be specified. It should also be clearly stated if the software has been validated, i.e., proven to provide results consistent with the algorithms to which the analyses are attributed

Strategy for repetition of urodynamic tests

- It is recommended that a urodynamic test should be repeated if the initial test suggest an abnormality, leaves the cause of troublesome lower urinary tract symptoms unresolved, or if there are technical problems preventing proper analysis

- The urodynamic findings and the interpretation of the results should be documented immediately after the study finished, i.e., before the patient has left the urodynamic laboratory. Doing so allows for a second test if required.

KIITOS!

