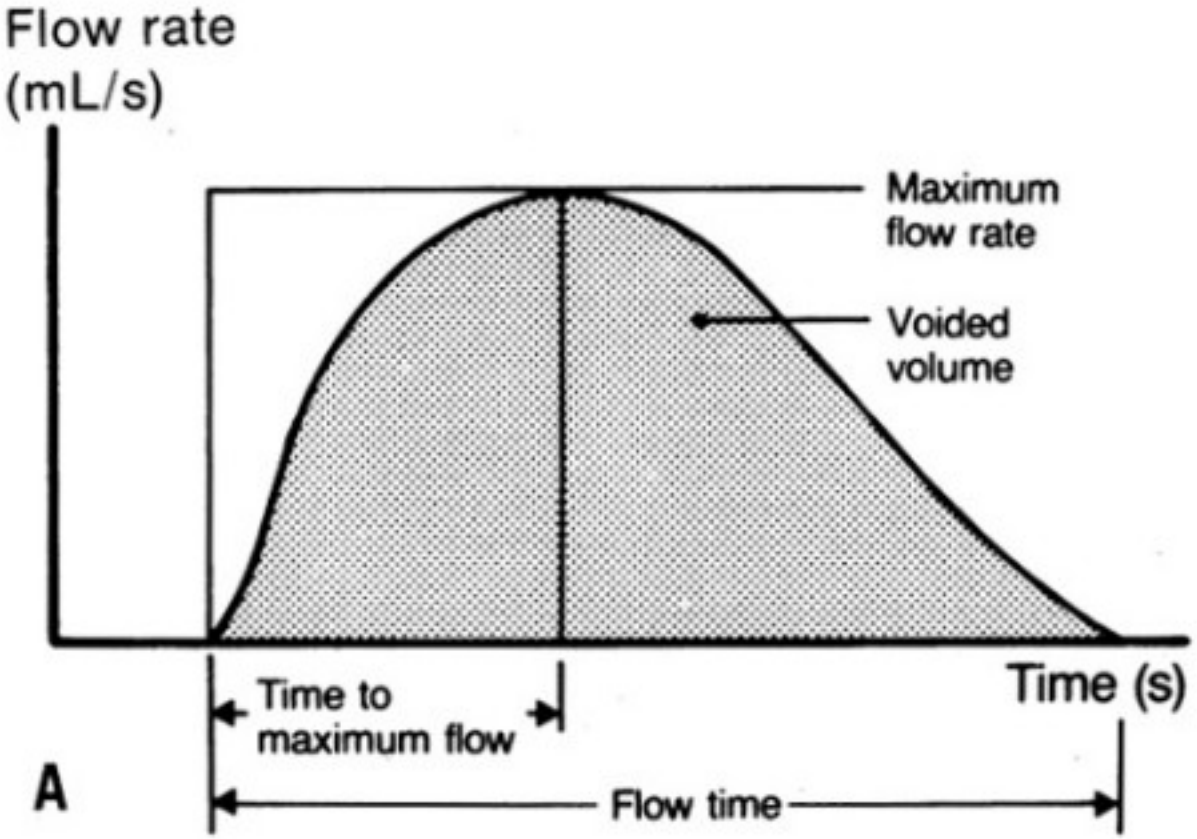
Turkish Continence Society
ICS Recognised Urodynamics Certification Course

Urodynamic Equipments

Dr. *Ersin Köseoğlu*

Uroflowmetry



Uroflowmetry A

Measurement principles of uroflowmetry devices

- Gravimetric (through weight and hydrostatic presure)
- Measurement methods using spinning discs
- Dipstick capacitance measurement procedures

Cystometry (Classification)

- According to a type of measurement
  - Single channel cystometry
  - Multi-channel cystometry
- According to the material used to fill the bladder
  - Fluid cystometry (water or saline)
  - Gas cystometry (carbon dioxide)
  - Video-cystometography (video-urodynamics) (radio contrast added saline)

Principles of cystometry

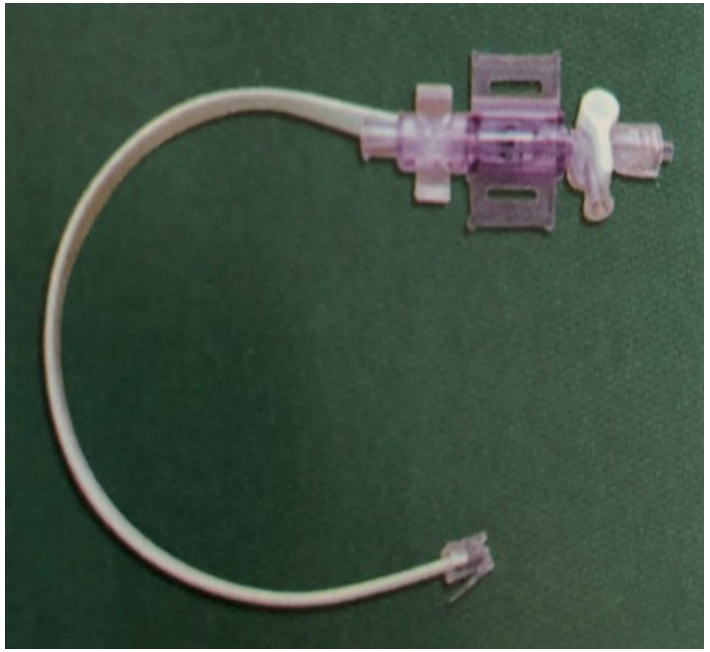
- During cystometry (excluding single channeled type) pressure values of intrabdominal (most frequently through rectum) and bladder cavities are measured.
- Back then this measurement was done by inserting a catheter inside the bladder and connecting it to the water column.
- Transducers are used in modern urodynamics devices for pressure measurements.

Pressure transducers

- Pressure transducers are devices converting pressure changes into electrical currents.
- These fluctuations in electric currents can be augmented by an amplificator and printed on a paper by a recorder.
- Pressure changes converted into electric currents in modern urodynamic devices can now be displayed on a PC screen after developmental breakthroughs in microchip technology.

Pressure Transducer Types

- External Pressure Transducers (Most Frequently Used)
- Transducers ported on the catheter tip
- Air conduct transducers

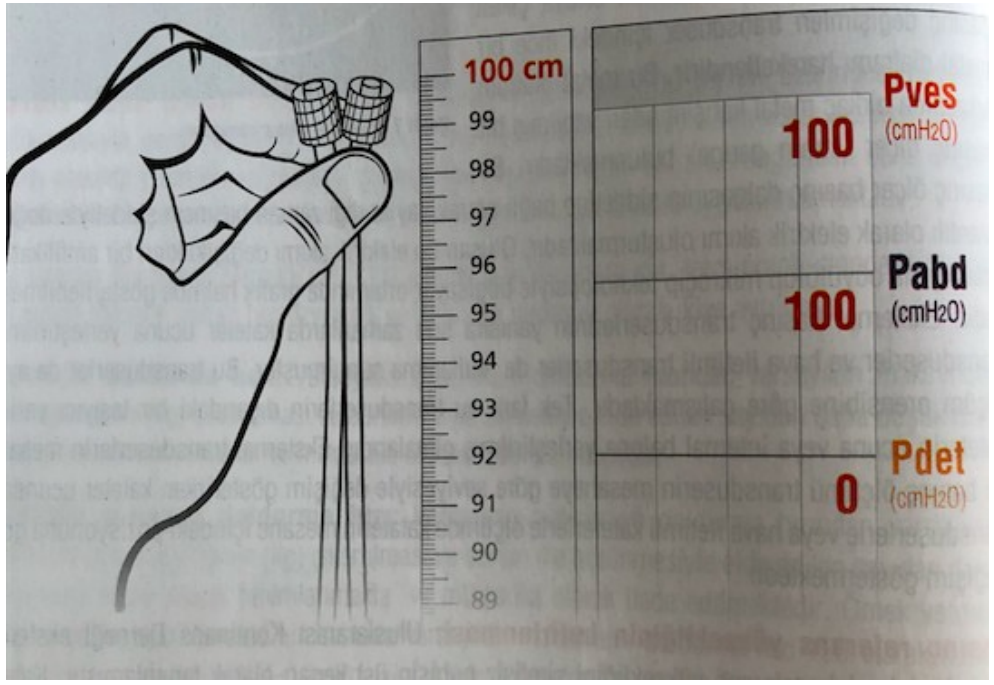


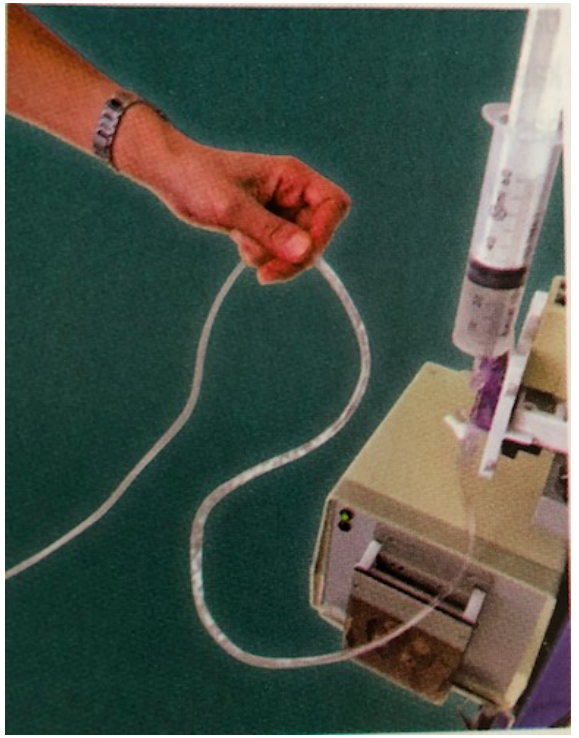
Determining a Reference For the Presurre Level

- ICS has set the reference height for external transducers as the upper margin of the symphysis pubis.
- The reference height for microtips ported on the tip of a catheter and transducers using air conduction is the balloon at the tip of the catheter or frankly the catheter itself.

Calibration of the transducer

- The device should display the digit «0» as the open end of the connection tube filled with saline or water used for connecting transducer to the main device also indicates the designated reference point of zero.



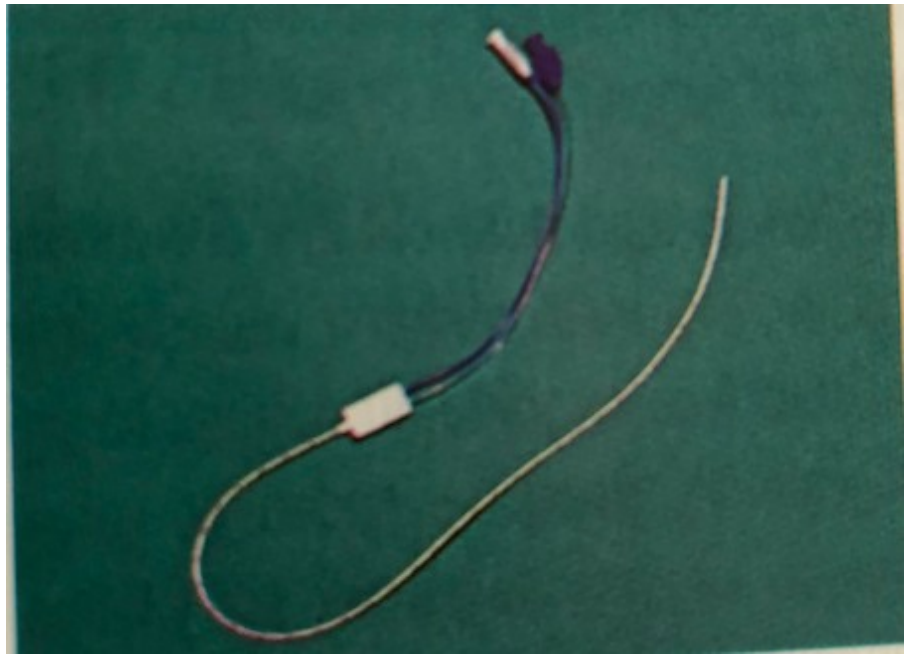


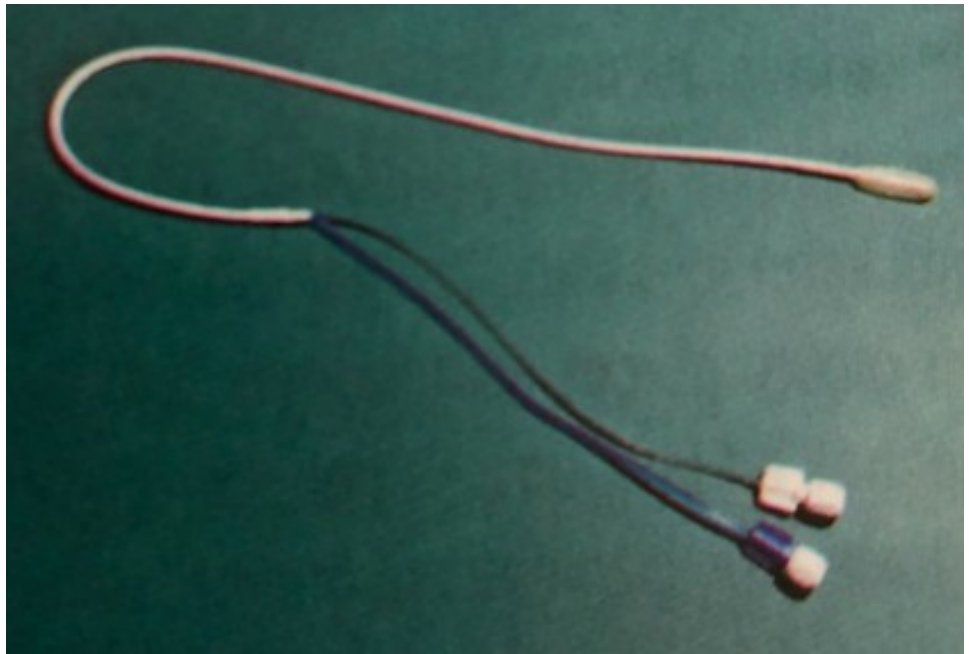
Resetting the device

- Atmospheric pressure is accepted to be level zero.
- Transducers are connected with two particular 3 way sinks.
- One of these sinks is connected to an injector filled with saline used to remove the air bubbles,and the other is connected to a connection tube filled with water.
- Transducers should be localised at the upper margin of the symphysis pubis set as the pressure reference level.
- When the open end of the tube used to connect the catheter is on the level of the transducer and after its made sure that there are no air bubbles left in the tube by gradually injecting fluid through it; the sink around the injector is shut-off and the system is reset.

Cathethers used in cystometric measurement

- Catheters specified for Pves and Pabd measurements are being used.
- Cystometry catheters with double lumen
- Catheters specified for rectal pressure measurement



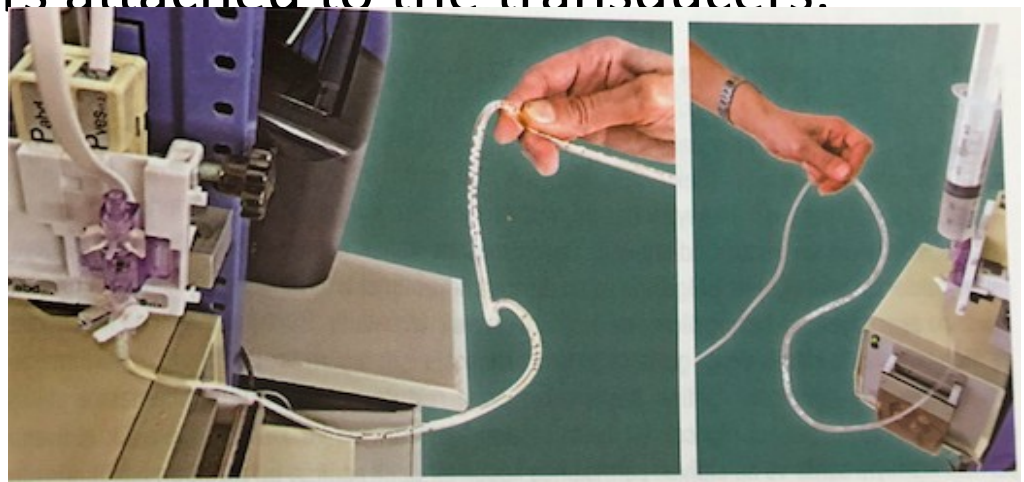


Cathehters used in cystometric measurements

- Catheters should be thicker than 6Fr.
- Pressure levels in bladder cavity and intraabdominal cavity should be measured concomitantly.
- Pdet=Pves-Pabd

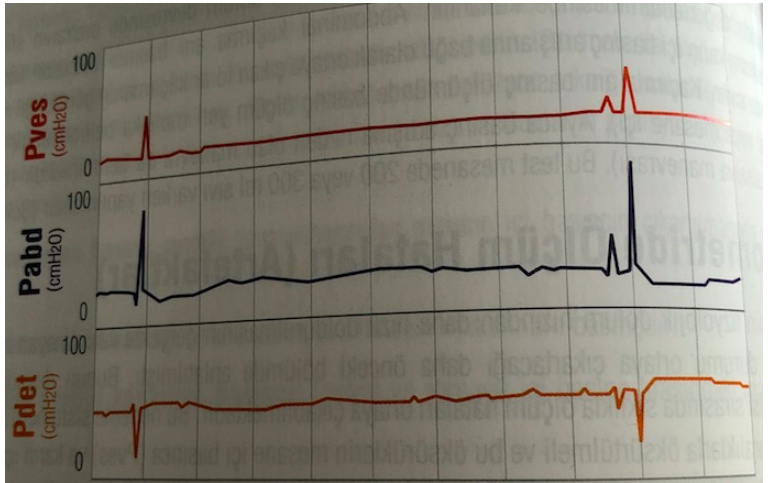
Measurement errors in cystometry (Artefacts)

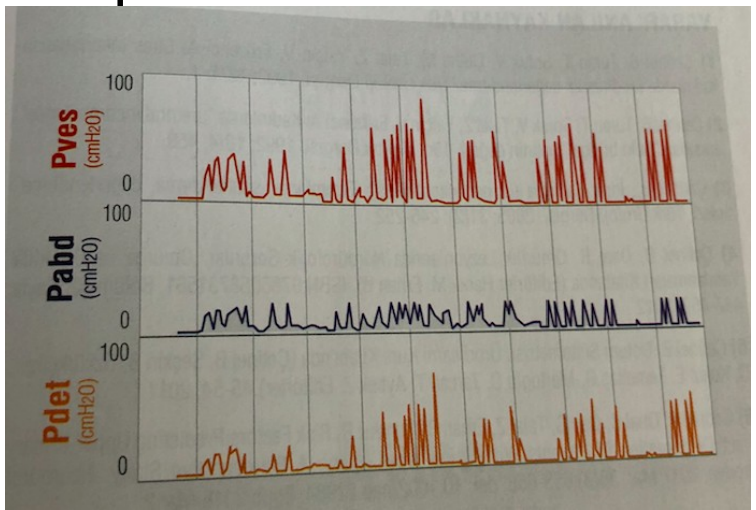
- If the pressure levels are not found to be equal in bladder and rectum after patient is asked to perform valsalva maneuver; all of the connection tubes and catheters should be controlled for fluid leaks or air bubbles by checking every part starting from the parts connected to the patient.
- For correcting this error, connection tubes and cathethers are flushed with saline by injectors attached to the transducers.



Measurement errors in cystometry (Artefacts)

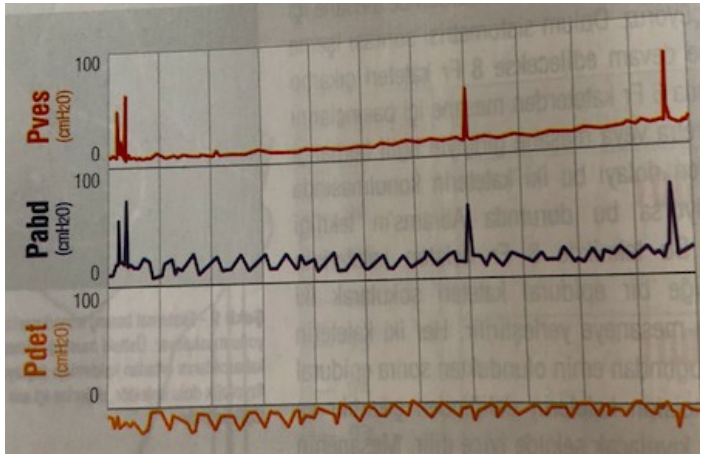
- If the increase in intraabdominal pressure does not proceed in concert with the increase in pressure of the bladder cavity detrusor pressure can be found falsely negative.
- Contrarily if the increase in the intrabdominal pressure is less than the overall increase in pressure levels of the bladder cavity then it can be falsely assumed that there is an increase in the detrusor pressure.





Measurement errors in cystometry (Artefacts)

- If unequal presurre measurements are recorded despite flushing the cathethers with saline, the position of the cathethers in the baldder and the rectum should be checked.
- The cathether in the bladder may shift to the sphincter region.
- Cathether in rectum may shift to the anal sphincter or outside.
- If the cathether leans to baldder wall too much there might be errors in measurement of pressures.
- The system might get clogged if the patients rectum is filled with too much fecal material.
- During the cystometry there might be muscle twitches in some of the patients..



Pressure flow urodynamic study

- The natural voiding position of the patient should be taken into consideration and the device should be prepared suitable for it.
- Men should be in an erect position.
- Women should be in sitting positions.
- If the patient has a problem with maintaining balance patient should be accompanied.