



How to perform urodynamics in children: tips and tricks

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We have no disclosures regarding this presentation

The urodynamics machine is kindly provided by UroTex



Who performs a urodynamic study?





Urodynamics in children

- Investigation is mostly similar as in adults
- Differences in indications and implementation
- Aim: determination of the physiology of the lower urinary tract

A full urodynamic study is an <u>invasive</u> study

Before performing a full urodynamic study, first non-invasive urodynamics:

- Bladder diary (multiple successive days)
- Uroflowmetry (if applicable)



How to perform urodynamics in children: tips and tricks

Preparation of the child

Your urodynamics equipment

Quality control

Interpretation of the cystometry

Interpretation of the pressure-flow study



Preparation of a urodynamic study in children

A full urodynamic study is an <u>invasive</u> investigation

A good preparation is key

- At the doctors office
- At home
- Before the investigation
- During placement of the catheters





Preparation at the doctors office

What is the indication for a urodynamic study?

And the question you want to be answered

Tell the child (and the parents)

- What a urodynamic study is
- Why a urodynamic study might be helpful
- Acknowledge the (potential) anxiousness

Give them a booklet (or QR code) with additional information



Preparation at home

Instruct the parents to prepare the child

- Use the booklet
- Include specific instructions:
 - "Tell your child that he will get a urethral catheter, which will give an uncomfortable, tickling sensation"
- Include also tips for the parents themselves
 - They will also be anxious for their child





Preparation before the investigation

Effective use of 'pain and anxiety relief' (PAR) techniques

- Environment
- (Re)do anamnesis
 - Ask for changes between earlier appointment and investigation
 - Determine what the best PAR methods will be for the child
- Explain again what the investigation is
 Use helpful language
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Preparation before the investigation

Helpful language:

- Do not use 'we will <u>try</u>' (implies it can fail)
- Do not use 'pain' (but avoid false reassurance)

Positive and concrete:

- "The rectal catheter will feel similar to a suppository"
- "The placement of urethral catheter will be unpleasant, but the better you blow, the less you will feel"
- "Tell me, what are you feeling"



(Preparation) during the placement of the catheters

Use PAR

- Distraction (video)
- Give a concrete task
- Take your time
- "Feel" what the child need
- Stay positive

The use of calming agents? Sedation/Midazolam/Nitrous oxide

- No clear guidelines
- Differences in clinical practice





Urodynamic parameters





Your urodynamic equipment







Types of pressure sensors

Water-filled

Air-filled

Microtip

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Which one do you use?

Urodynamics with water-filled sensors

Pressure transmission: expanding membrane





Continuous water column (so no air bubbles!)



Demo

Setting up

- Sensors at pubic symphysis
- Calibrate ('zero')
- Flush, gel/air







Pressure values





Pressure values

TINS



Age/height dependent

Water column



Water column (30-40) cm H2O



Pressure values



Quality control: zero







Quality control: baseline pressures



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Quality: mirrored and subtraction



Quality: good subtraction cough/valsalva





Quality: mirrored, moderate subtraction



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Quality: poor subtraction





Troubleshooting

Air bubbles

• Flush

Blocked tube

- Flush
- Switch channels
- Wait
- Reposition (Partially) expelled catheter
- Reposition
- Sometimes: accept

DomeDome niet goed vast (of lek?)

- Vast zetten
- Vervangen





Do's & Don'ts

Do's (tips)

- Rectal balloon with slit
- No rectum?
 - Vaginal
 - Stomal (poor quality)

Don'ts

- 'Zero' in the patient
- Pves = Pabd



















Demo

Setting up

- Calibrate ('zero')
- Charge
- Differences with water-filled



Quality: poorly mirrored



Troubleshooting

Air leakage

• Tighten and re-charge

Blocked channel

• Manipulate and re-charge

Failing sensor

Swap sensor





Do's & Don'ts

Do's (tips)

• Empty balloon before charging (squeeze, cough)

Don'ts

- 'Zero' in the patient
- Pves = Pabd
- 'Over'-charge
- Water in air channel



Urodynamics met microtip sensors

Pressure sensor in the catheter tip

- Reusable
- Disposable

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Weight increase of time







Uroflowmetry

Quality

• Short distance to meatus (delay ~0,8s)

Artefacts

- Bumping against flow meter
- Missing flow meter
- 'Wagging' artefact







Cystometry (filling phase)

Filling rate: 5-10% of the expected bladder capacity per minute

- Preferably slower than faster
- Use the bladder diary

Saline temperature: 21-37C

When to stop the filling

- (Start of voiding)
- Strong urge or discomfort
- Detrusor pressure > 40cmH20
- Leakage rate > filling rate
- Filled volume > 150% of expected bladder capacity [(age +1)*30]

Repeat the investigation at least once



Cystometry (filling phase)

Repeat the investigation:



Normal diagnosics:

- Changes in pressure (detrusor overactivity / compliance)
- Filling sensation
- Bladder capacity
- (Effect of stress tests)

Changes in pressure:

Detrusor overactivity (DO)

- Any increases in detrusor pressure caused by a bladder contraction
- Is always pathological
- Be aware of rectal contraction/relaxation
- Note if the child also feels the DO
- Is not the same as overactive bladder (OAB)

Compliance

- "Elasticity" of the bladder
- Steady increase during filling of the bladder
- Often a slight decrease when the filling is stopped

Filling sensation

- Difficult to assess in children
 - Note signs of discomfort (wiggling of the toes)
- Normal values are unknown
- Reliability: does the measurement effect the sensation?

Bladder capacity

- In adults: filling till 'strong desire'
 - In children, sensation not always reliable
- Situational effects
- Normal values (age+1)*30

Example

Changes in pressure:

- Compliance OK
- Detrusor overactivity after 350ml, maximal 70cmH20

Sensation:

 Late first sensation at 350ml, coupled with DO

Capacity:

• OK capacity of 400ml, limited by DO

Effect of stress tests

Not performed

Correct the volumes for pre-existent or diuresis

Pressure-flow study (voiding phase)

Normal diagnostics:

- Urethral resistance
- Detrusor contractility
- Post-void residual

Pressure-flow study: urethral resistance

Combination of pressure and flow

Measures (BOOI, URA, linPURR, etc) all based on adult males

Not applicable in (young) children

- Urethral diameter 2mm vs 6mm
- Urethral length 10cm vs 20cm
- Catheter effect?
- Urethral elasiticity?

No normal values in children Functional vs anatomic obstruction

Flowrate available?

Pressure-flow study: detrusor contractility

"Power" output of the bladder

Combination of pressure and flow

Measures (Detrusor Contractility Index, Watts curve) not validated in children

Strong/Normal/Weak detrusor contraction

Flowrate available?

Example

Questions

