

# Urodynamics Documentation

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# Objectives

- Learn how and why to appropriately document urodynamics
  - Indications
  - Patient history
  - Procedure
  - Interpretation

# Differences from site to site

- Not all of our sites may have the same exact way of documenting
- Varied tools and formats
  - Paper documentation
  - Electronic documentation
- Regardless of the method of documentation, there are certain key items that should be documented

# Components of 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

# Documentation prior to starting the study

- A thorough history is extremely important to obtain prior to performing the study
  - History should include
    - Medications
    - Prior surgeries
    - Voiding/bowel diary OR cathing diary
    - Any significant medical history

# History- voiding/bowel diary

- Voiding diary helps to define the functional bladder capacity
  - The child's functional bladder capacity can be assessed as the largest voided volume, with the exception of the morning micturition, which actually represents night time bladder capacity
- Frequency/volume chart is a detailed diary recording fluid intake and urine output over 24-hour periods
  - Gives objective information on the number of voidings, voided volumes and episodes of urgency and leakage, or dribbling
  - Defecation frequency, Bristol stool type, soiling should be recorded in this chart as well
    - Constipation, fecal impaction, or fecal incontinence affect lower urinary tract function and contributes to urinary incontinence in various ways

# History- voiding diary

- A 3-day voiding diary should be done
  - Provides a comprehensive picture of when and how frequently incontinence occurs, and what associated symptoms are present
- A voiding and defecation history and voiding and defecation diaries are the most important sources of information on the function of the lower urinary tract and gastrointestinal tracts, and can direct the course of subsequent investigations
  - These are invaluable in pediatric patients

# History- cathing diary

- Should include 3 days of 24-hour periods
  - Monitors fluid intake and catheterized volumes
  - All diaries should include specific times of intake and outputs



# History- previous surgeries/medications taken

- Important when comparing previous urodynamics to those currently being performed
- Important to determine if medications are working

# Uroflow

- Uroflowmetry is an indispensable, first-line screening test for most children with suspected lower urinary tract dysfunction
- Normal voiding occurs when the bladder outlet relaxes and the detrusor contracts
- Ideally uroflowmetry should be repeated 2 or more times to ensure that a consistent voiding pattern is exhibited
  - Always precludes further invasive testing (UDS)

# Uroflow

- Most important measurements to document
  - Maximum flow rate ( $Q_{max}$ )
  - Average flow rate ( $Q_{ave}$ )
  - Voided volume (VV) which is a rough indicator of quality
  - Bladder capacity
    - This is done by adding the voided volume to the post void residual (PVR)
  - Post void residual

# Uroflow

- Maximum flow rate
  - Physiologically dependent on the bladder volume
- Voided volume
  - Volumes less than 100ml, or less than 50% of expected functional volume for age, can not be interpreted reliably
    - This may represent voiding on command, and many children will try to comply by using abdominal pressure
- Post void residual
  - Is important to identify because the normal bladder should completely expel all urine at the time of voiding, with the exception of newborns
  - Voided volume and duration between the void and PVR should be recorded

# Uroflow- interpretation

- Uroflow patterns
  - Continuous
    - Indicates absence of obstruction and adequate detrusor contraction strength
    - A smooth curve roughly shaped like a bell-grade curve that may be slightly skewed to the left
    - Free from rapid changes in amplitude
  - Prolonged
    - Low  $Q_{max}$  and  $Q_{ave}$
    - Plateau-shaped flow pattern
    - High risk for bladder outlet obstruction and poor detrusor contraction

# Uroflow- interpretation

- Intermittent
  - Shows an interrupted flow
  - Rapid fluctuations in the urinary flow rate
- Staccato
  - Does not stop completely as with intermittent
  - Fluctuates due to incomplete relaxation of the sphincter

# CMG- Performing

- Size/type of catheter
  - For the measurement of intravesical pressure and for bladder filling, the standard catheter for routine urodynamics is a transurethral double-lumen catheter
  - Major advantage of a double lumen catheter is that the fill/void sequence can be repeated without the need for re-catheterization
    - 5Fr, 6Fr, 7Fr, and 10Fr
    - Coude catheter and Foley catheter available for some systems

# CMG- performing

- Solution type
  - ICCS states that .9% saline or contrast medium should be used
- Solution temperature
  - Body temperature is ideal



# CMG- performing

- Fill rate
  - Bladder filling should be performed at a rate of 5% to 10% of the expected bladder capacity per minute
    - The rate of filling may have an effect on capacity, intravesical pressure, and compliance
  - Bladder capacity in ml can be calculated as: 30 plus (age in years x30)
    - There are other calculations, but this one is most widely used
  - When detrusor overactivity or a low compliant bladder is noted, the second filling is done with a filling speed of <10ml/min

# CMG- performing

- Position of patient
  - Children can be placed in the supine or sitting position
    - No significant difference in measurement outcomes based on variability of position
      - Study by Lorenzo et al
    - There is a difference especially in spina bifida
- Type of electrodes
  - EMG patch electrodes
  - Needle electrodes
    - Needle electrodes are not recommended in children

# CMG- performing

- Bladder sensation
  - Increased sensations
    - Sensations occur at low volumes
  - Reduced sensations
    - Delayed and diminished
  - Absent sensations
    - May be identified when greater than expected bladder capacity has been reached without a change in sensation
  - Difficult to evaluate in children
    - Toilet-trained, cooperative children

# CMG- performing

- Bladder sensation
  - First sensation
  - First desire to void
    - Not relevant in infants
    - Should be considered as the volume at which some unrest is noted (wriggling of toes)
  - Strong desire to void

# CMG- interpretation

- Capacity
  - Large
  - Normal
  - Small
- Functional bladder capacity
  - The volume of urine accumulated in the bladder prior to voluntary micturition
  - Can be estimated from the patient's frequency-volume bladder diary
- Maximum cystometric volume
  - Calculated from volume voided plus residual volume

# CMG- interpretation

- Compliance- measures distensibility of the bladder wall during storage
  - Normal
    - Pressure at the expected volume for age should not exceed 10cmH<sub>2</sub>O
    - Pressure rises only near maximum volume
  - Abnormal
    - Pressure exceeds 10-20cmH<sub>2</sub>O
    - Linear increase in Pdet during filling
    - Sustained Pdet greater than 40cmH<sub>2</sub>O is specifically linked to renal or upper tract damage
- Overly rapid filling can exaggerate the increase in basic pressure resulting in poor compliance measurements

# CMG- interpretation

- Detrusor response to filling
  - Normal
    - Bladder volume increases during the filling phase without a significant rise in bladder pressure
    - No overactive contractions are registered during filling, or when provoked by coughing or hold-up maneuvers
  - Detrusor overactivity
    - Any involuntary detrusor contraction greater than 15cm H<sub>2</sub>O from baseline during the filling phase
    - Can be provoked by rapid filling, use of cold saline, alterations of posture, and coughing
  - Detrusor underactivity
    - May be noted when there is a poor, unsustained or nonexistent detrusor contraction during micturition accompanied by a larger than expected bladder capacity for age (< 150% of EBC)

# CMG- interpretation

- Leak point pressure
  - Detrusor leak point pressure
    - >20cm H<sub>2</sub>O may be damaging to bladder
    - >40cm H<sub>2</sub>O may be damaging to kidneys
  - Valsalva leak point pressure
    - Patient asked to increase intra-abdominal pressure by performing valsalva maneuvers, coughing, etc.
    - Low readings indicative of conditions related to sphincteric weakness



# CMG- interpretation

- EMG- used to gain information regarding the coordination of the perineal muscles with the detrusor muscle
- EMG activity
  - During filling
    - Activity during contractions?
  - During voiding
    - Functional obstruction is often the result of pelvic floor muscle contractions which are registered and recorded on patch EMG
    - Should be no activity during voiding

# Video or Non-video urodynamics

- Combining fluoroscopic video imaging can significantly improve the diagnostic accuracy
- Allows for real-time measurement of the exact detrusor pressure when urinary leakage or VUR occurs
- Reveals overall shape and contour of the bladder and bladder neck during filling and voiding

# Coding for urodynamics

- CPT codes
  - 51728- cmg with voiding pressure study
  - 51797- intra-abdominal voiding pressure rectal
  - 51784- electromyography study of anal or urethral sphincter
  - 51741- complex uroflowmetry
  - 51726- complex cystometrogram
  - 51701- insertion of catheter
  - 76000- fluoroscopy
  - 74455- urethrocystography
  - 51600- injection for cystourethrogram

# Coding for urodynamics

- ICD-9 codes
  - 596.59- dysfunctional void
  - 788.21- incomplete bladder emptying
  - 788.37- continuous incontinence
  - 788.34- sensory incontinence
  - 788.31- urge incontinence
  - 596.51- overactive bladder
  - 788.41- frequency
  - 596.55- detrusor sphincter dys
  - 788.20- urinary retention

# Coding for urodynamics

- 596.54- neurogenic bladder
- 741.90- spina bifida
- 756.13- sacral agenesis
- 742.59- tethered cord
- 593.70- reflux
- 599.0- urinary tract infection
- 595.20- chronic cystitis
- 591- hydronephrosis
- 788.63- urgency
- 596.4- atonic bladder

# Summary

- Indication
  - Reason for doing the study
- History
  - Medications/Allergies
  - Previous surgeries
  - Voiding/bowel diary OR cathing diary
  - Significant medical history

# Summary

- Uroflow procedure note
  - Voided volume
  - Post void residual
  - Electrode type
- Uroflow interpretation note
  - Uroflow pattern
  - Peak flow
  - EMG activity

# Summary

- CMG procedure
  - Size/type of catheter
  - Solution type
  - Solution temperature
  - Fill rate
  - Position of patient
  - Type of electrodes
  - Sensations
  - \*\*Video/non-video



# Summary

- CMG interpretation
  - Functional bladder capacity
  - Compliance
  - Detrusor response to filling
  - Detrusor leak point pressure
  - Valsalva leak point pressure
  - EMG activity

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