

Urodynamic Interpretation in Children with Spina Bifida: Pitfalls and Disagreements

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Disclosures

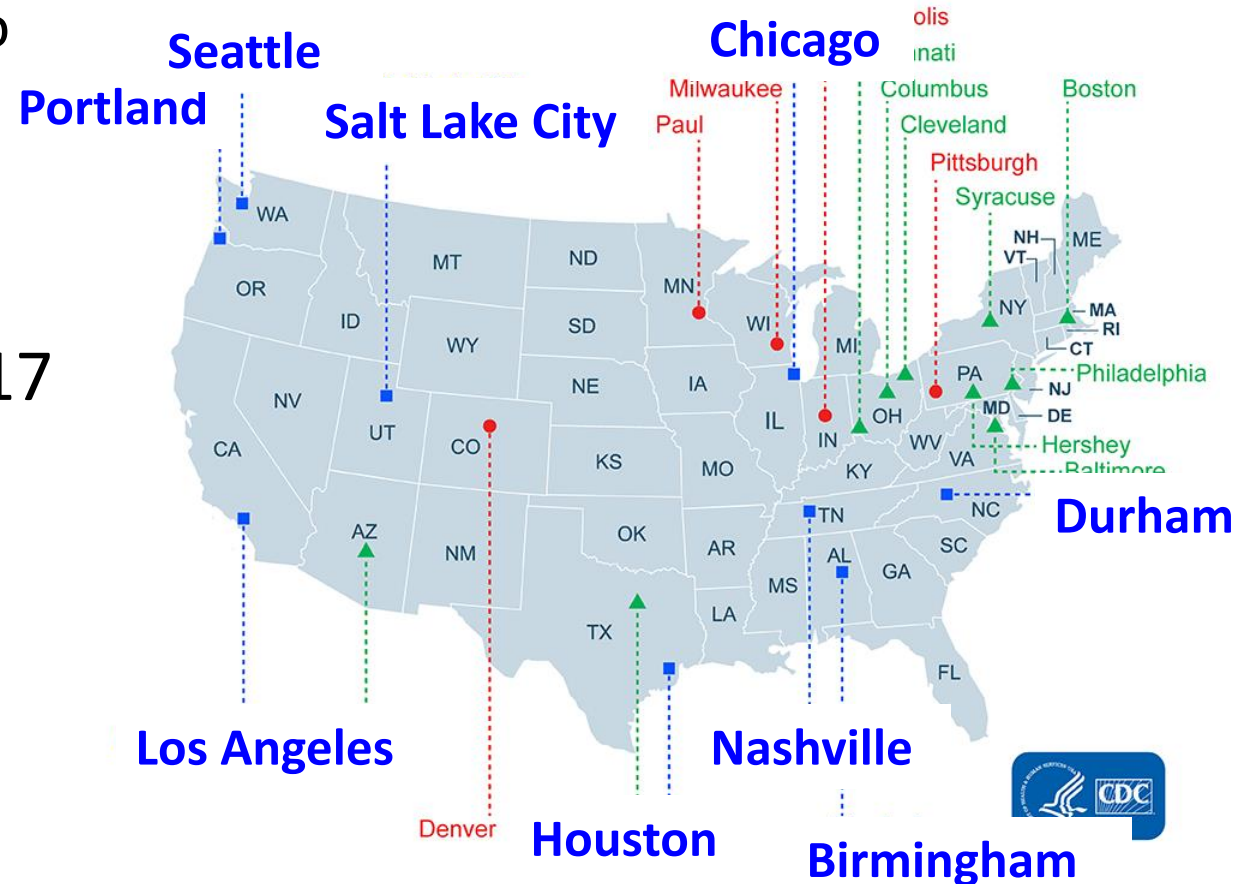
- Grant/Research Support: Centers for Disease Control and Prevention

Introduction

- Detrusor sphincter dyssynergia and DLPP > 40 cm H₂O associated with renal deterioration
- Videourodynamics can have low interrater reliability
- How do we optimize videourodynamics from multi-center studies?
- Critical assessment of how/why pediatric urologists disagreed on whether a bladder was hostile

Methods

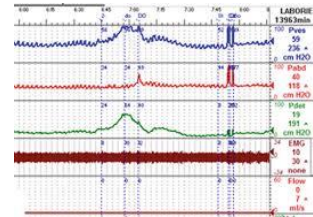
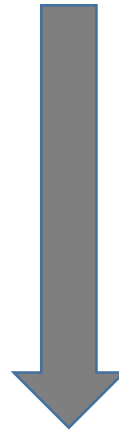
- UMPIRE: Urologic Management to Preserve Initial Renal Function for Young Children with Spina Bifida
- Baseline urodynamics <4 mo
- Initial studies: 5/2015 to 9/2017



Methods



9 clinical sites



Outside review:

Chris Austin
 Duong Tu
 John Wiener
 Elizabeth Yerkes



Patient UID #	9707064192	Month/Year of Study	August 2015
Patient age in years	3 mos	Patient's weight at study	5 kg
Submitting Institution	SLC		
Fill rate	4 mL/min		
Estimated bladder capacity by age or weight-based formula: (if <1y: (wt in kg) ⁷) (if >1y: (age in y+2)*30)	35 mL		
Post Void Residual	10 mL		
Reviewing Urologist		Date of Review	
		If disagree, why?	
Detrusor Pressure at 50% Expected Volume	10 cmH ₂ O	Agree <input type="checkbox"/>	Disagree <input type="checkbox"/>
Detrusor Leak Point Pressure <input checked="" type="checkbox"/> OR End Fill Pressure <input type="checkbox"/> (Please check one)	65 cm H ₂ O	Agree <input type="checkbox"/>	Disagree <input type="checkbox"/>
Neurogenic Detrusor Overactivity	Present <input checked="" type="checkbox"/> Absent <input type="checkbox"/>	Agree <input type="checkbox"/>	Disagree <input type="checkbox"/>
Detrusor Sphincter Dyssynergia	Present <input checked="" type="checkbox"/> Absent <input type="checkbox"/>	Agree <input type="checkbox"/>	Disagree <input type="checkbox"/>
Overall Bladder Classification	Normal <input type="checkbox"/> Abnl but Safe <input type="checkbox"/> Intermediate <input type="checkbox"/> Hostile <input checked="" type="checkbox"/>	Agree <input type="checkbox"/>	Disagree <input type="checkbox"/>

Outcome measured: agreement on overall bladder classification

Methods

i. Normal

The bladder should have normal capacity and compliance and empty to near completion at a relatively low detrusor pressure. Leakage before voiding, detrusor overactivity, and DSD are not seen.

ii. Safe (but not normal)

Bladder capacity can be normal, low, or high. Compliance is normal or mildly decreased, but the end filling pressure or DLPP must be < 25 cm H₂O. If bladder capacity and compliance are normal, emptying is poor or absent. (This factor should not be sole reason to choose abnormal in infants as many do not empty completely.) Leakage may be present. Definitive evidence of DSD is not present on either EMG or fluoroscopy. Detrusor overactivity should not be present on CMG.

iii. Intermediate

This category is a grey zone for bladders that are neither safe nor hostile (see below). Bladder capacity may be low, normal, or high. Compliance is reduced with end filling pressure (measured prior to DO or voiding contraction, if present) or DLPP of 25-39 cm H₂O. Detrusor overactivity (≥ 2 contractions of ≥ 15 cm H₂O over baseline) or voiding contractions may be present but are not accompanied by DSD.

iv. Hostile

This pattern should be obvious and is noted if one or both of the following criteria are present:

- a. The bladder has poor compliance with an end filling pressure or DLPP ≥ 40 cm H₂O.
- b. Bladder contractions or detrusor overactivity, if present, are accompanied by DSD.

Definitions:

1. **Detrusor Overactivity** – ≥ 2 contractions of ≥ 15 cm H₂O over baseline
2. **DSD** – may be present on EMG, fluoroscopy, or both
3. **End filling pressure** – should be measured immediately prior to a voiding or NDO contraction, if present; alternatively this may be measured at the end of filling if the study is terminated due to discomfort or other cause
4. **Fill rate** – as per ICCS recommendations, slow fill cystometry (5-10% of EBC per min, or <10 ml/min) is recommended

Results

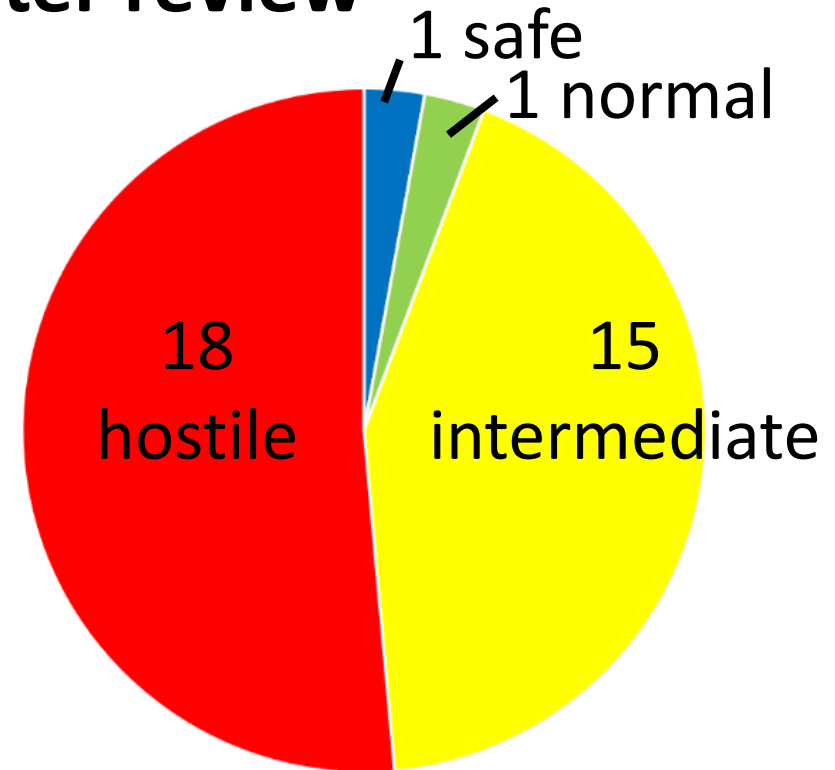
- 158 newborn studies from 9 clinical sites underwent review
- All 3 reviewers independently agreed on 58% (92/158)

Results – bladder classification

Original

- Characterized as hostile: 35/158

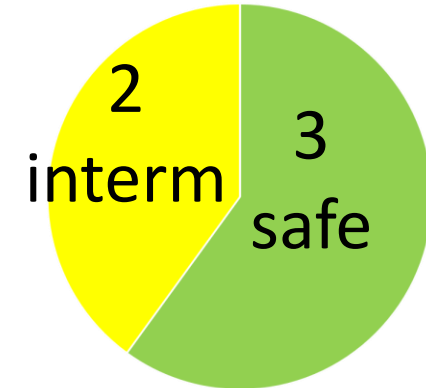
After review



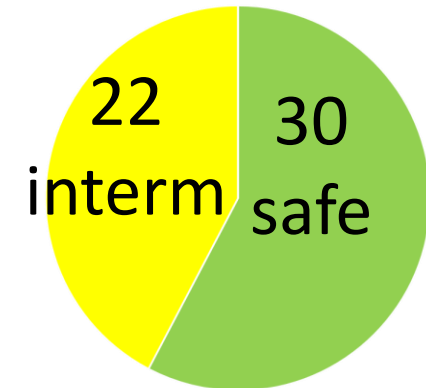
Results – bladder classification

Original

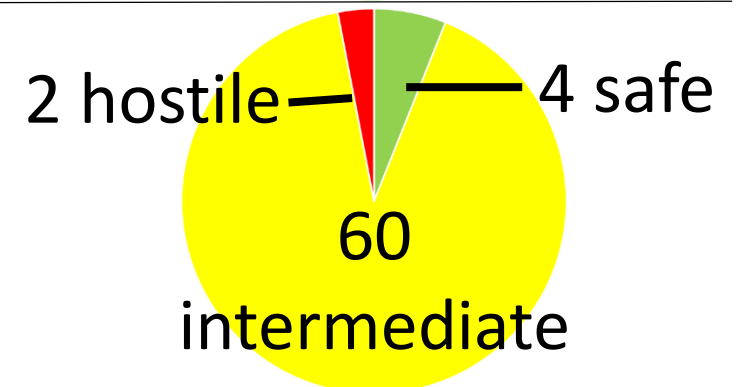
- Characterized as normal: 5/158



- Characterized as safe: 52/158



- Characterized as intermediate: 66/158



Results – Next Steps/ Lessons Learned

- Feedback review results to original sites
- Problems of technique
- Problems of interpretation
 - What counts as NDO?
 - What counts as DSD?
 - Where to measure the pressure in the presence of contractions?
 - Is it a voiding contraction or NDO?
 - What is a normal infant bladder?

Conclusions

- Ability to reliably identify hostile bladders is low even among high volume specialized centers
- Problem areas for improvement identified
- Importance of continued efforts to standardize urodynamics