



Vesicoureteral Reflux in Children with Cerebral Palsy: Incidence and Association with Neurogenic Bladder Dysfunction on Videourodynamics

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Introduction

- Urologic manifestations of underlying neurogenic bladder dysfunction (NBD) in patients with Cerebral Palsy (CP) are common
- These manifestations include urinary frequency, urgency, incontinence, urinary retention, urinary tract infection (UTI) and morphologic changes in the bladder or upper tracts and in some, chronic renal disease
- When studied with urodynamics (UDS) the most common findings are neurogenic detrusor overactivity (NDO) in upwards of 85% of patients
- Detrusor sphincter dyssynergia (DSD) at the level of the external urethral sphincter (DESD; Figure 1) is seen in upwards of 45%
- When these patients are studied with videourodynamics (VUDS) we have come to appreciate over time that in addition to the high incidence of combined NDO and DSD (75%), DESD was noted in 45% of these patients while the remaining 55% the DSD occurred at the level of the internal sphincter (DISD; Figure 2)
- While vesicoureteral reflux (VUR) is known to occur in patients with CP there is little in the literature regarding its incidence and its association, if any, with particular types of NBD.
- We reviewed and report on our experience as regards VUR incidence and associated videourodynamic findings of NBD in these children.

Methods

- The records of all 44 pediatric patients with CP in our IRB data base evaluated with VUDS were reviewed.
- Those patients found to have associated VUR on VUDS or prior imaging were included and their associated VUDS findings analyzed.
- This included 4 patients previously diagnosed with VUR who underwent surgical re-implantation (3) or endoscopic injection (1)

Figure 1. Example of detrusor external sphincter dyssynergia (DESD).

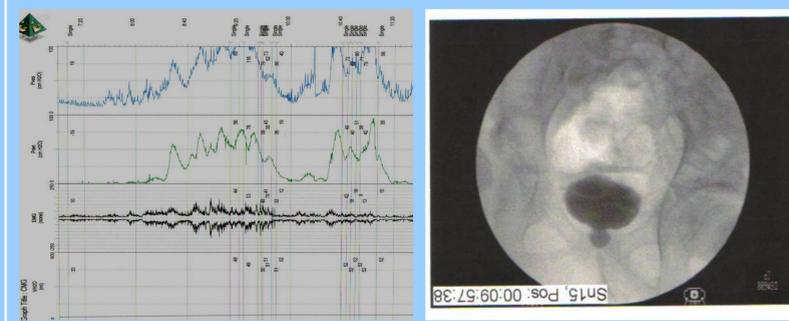
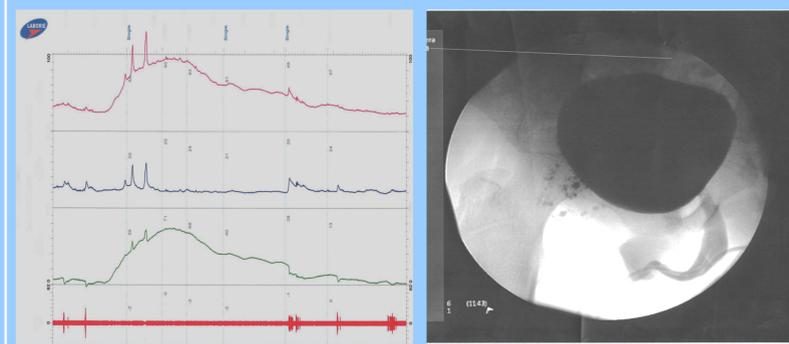


Figure 2. Example of detrusor internal sphincter dyssynergia (DISD).



Results

- The group consisted of 27 males (mean age 11.9 yrs), 17 females (mean 7.4 yrs) with a range 2.5-18 yrs for all. The most common reasons for referral were urinary incontinence (82%) and UTI (36%); 19/44 (43%) were self or parent referred.
- Nine of 44 children (20%; 5 boys, 4 girls) had VUR into 15 renal units:
 - VUR was bilateral in all 4 girls and 2/5 boys
 - Grade of VUR was mild/moderate (2-3) in 9 renal units and severe (4-5) in 6 renal units
- History of UTI reported in 5/9 (56%): 4/4 girls and 1/5 boys
- NDO noted in all 9 children with VUR
- DSD was noted in 8/9 (89%) of children with VUR:
 - DESD in 2/8 of children (25%)
 - DISD in 6/8 of children (75%)
- In the 4 children previously treated for VUR, while they did not have evidence of reflux recurrence, all of them showed evidence of persistent neurogenic bladder dysfunction with associated DSD that required therapy

Conclusions & Comments

- Overall 20% of CP patients evaluated in this study had significant VUR associated with their neurogenic bladder dysfunction
- Of those with VUR, all had NDO and 89% also had associated DSD. While not unexpected given the association VUR is known to have in other conditions with dyssynergic or obstructive type voiding, more than half of this DSD occurs at the level of the internal sphincter
- Without VUDS this DISD would likely have been missed as urodynamics alone can only suggest obstruction but cannot identify where the impedance to flow is while a VCUG will only show a closed or poorly funneled bladder neck but not indicate to what degree the bladder was contracting, if at all, at the time of imaging
- These findings should serve as a cautionary note that when urodynamics are indicated in patients with CP, they are best evaluated with VUDS, particularly when there is a history of UTI, retention of urine, changes in bladder morphology or upper tract dilation and ideally before any surgical interventions are planned
- Patients previously treated surgically for VUR without having previously undergone urodynamics are most likely to have underlying NBD that will still require treatment. In retrospect, these patients may be better served if their NBD is identified and treated initially possibly negating the need for surgical intervention