Neurogenic Bladder in Children: Proactive Vs Reactive Approach

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Reacting to a problem after it arises

Preventing problems before they arise
Spina Bifida

- SB is the most common congenital neurological defect
- Bladder dysfunction highly common
- May result in:
  - Incontinence
  - UTI & Pyelonephritis
  - Renal scarring
  - Chronic kidney disease

Goals of Management

1. Preservation of kidney function
   - Dry and clean
   - Independent
   - Free from infection
Proper Bladder Function

- Store urine
  - At low pressures
  - Adequate capacity
  - Without leakage
- Empty urine
  - Bladder contraction
  - Open bladder outlet

Why Won’t My Bladder Work?

**Failure to store urine**
- Bladder
  - Too small
  - High pressures
- Bladder outlet won’t close!

**Failure to empty**
- Bladder
  - Won’t contract
- Bladder outlet won’t open!
Medical Management

- Clean intermittent catheterization
  - Roughly 85% of patients with spina bifida will require CIC long-term
- Anticholinergics (oxybutynin)
- Antibiotic prophylaxis
  - Concerns about efficacy, risks

Surgical Management

- Improved pressures, capacity
  - Botox, augmentation
- Improve continence
  - Outlet procedures
- Improve independence
  - Continent catheterizable stomas
What We Know

• Most kids with spina bifida are born with no or little hydronephrosis.
• Most kids with spina bifida have no reflux on VCUG or Video urodynamics.
• Most kids with spina bifida have no scarring at renal isotope scan.
What We Know

- High storage pressures can lead to kidney damage
- High storage pressures can lead to urinary reflux
- Kidney infections can lead to scarring of the kidneys

Unanswered Questions

- Optimal follow-up/imaging regimen?
- When to begin CIC?
- When to begin anticholinergics?
- How to manage urinary reflux?
- How to assess renal function?
  - Accuracy of Schwartz formula in SB?
  - How to measure “height” in a wheelchair?
Management Philosophies

<table>
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<tr>
<th>Reactive</th>
<th>Proactive</th>
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<td>• Change management when problems arise</td>
<td>• Close follow-up with frequent monitoring</td>
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<tr>
<td>• Less frequent monitoring</td>
<td>• Aggressive use of CIC and anticholinergics</td>
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<tr>
<td>• Less costly; less invasive</td>
<td>• Costly; invasive</td>
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There is still some controversy whether or not proactive treatment versus careful surveillance with rapid initiation of therapy when a change takes place is the correct method of treatment.

Proactive Vs Reactive Approach

- Both options are considered safe for development of renal function but differ in their perceived benefit for bladder development and later continence.

- Both approaches require:
  1) *Detailed physical examination*, evaluating presence of a palpable bladder or kidney.
  2) *Bladder and renal US* to evaluate bladder filling, PVR and hydronephrosis.
Reactive Approach

• In case of a negative physical examination and absence of hydronephrosis, reactive approach does not initiate CIC, video urodynamic studies, or anticholinergic medication.

• Regular follow-up with examination, creatinine value, and US are initiated, and parents educated toward the occurrence of UTI and decreased urine output.

Reactive Approach

• If hydronephrosis is detected or clinical problems occur, then urodynamic studies are done to determine if initiation of CIC and pharmacotherapy is needed.

• Proponents of this approach argue that acting on symptoms is sufficient to protect renal function and it is not justified to have all parents perform CIC.

• More observational and conservative.
**Reactive Approach**

1. Incidence of deterioration is **small**.
2. Can be **reversed** if treatment is instituted early enough after it occurs.
3. **Overall renal function is not impaired** when comparing reactive to proactive treatment.
4. Why subject the child and family to **risks that might be unfounded**.
5. Why subject parents to **learn techniques** and be even more burdened by procedures when caring for their children than they truly need.

**Proactive Protocol**

- The concept of instituting a prophylactic regimen for bladder at risk was introduced in the early 1990s. Early intervention is herein defined as **CIC and antimuscarinic therapy**.

- Initial management is dictated by the findings on **urodynamic assessment irrespective of the upper urinary tract appearance** on US imaging.

- Aims to promote detrusor muscle relaxation and development by bladder cycling and ensure bladder drainage to protect the upper tracts and prevent hydronephrosis.
Proactive Protocol

• No intervention is necessary in the child with
  – Synergic sphincter who voids to completion with normal pressure.
  – Complete denervation, a low leak-point pressure.

• Patients with:
  – Increased leak point pressures
  – Detrusor sphincter dyssynergia (DSD)
  – Noncompliant bladder muscles

are placed on CIC every 4 to 6 hours during the day, and anticholinergic therapy with oxybutynin is initiated.

Proactive Protocol

• Proponents defend their approach by the fact that most patients will need to perform CIC later to achieve continence and it is easier if the child remains used to the procedure.

• Prophylactic antibiotics have not been proven to be useful in preventing infections, but no uniform treatment protocols exist.
Proactive Protocol

- CIC begun in newborn period showed no harms to infants, places no undo difficulties on parents.

- Ease of accepting CIC as a regular means of emptying their bladder as child grow.

- Ability to attain continence with less adjunctive medical and surgical measures.

- Achieving independence in self management of lower urinary tract, when this program is begun early in the life of the child.

- Ultimate reduced need for augmentation cystoplasty, with its attendant set of complications.

Our policy

- Begin CIC and anticholinergic medication in the first few days of life in all patients at high risk for later bladder or upper urinary tract deterioration.

- CIC is a safe and effective way of emptying the bladder with a low incidence of complications, such as epididymitis and mechanical trauma.

- In most cases parents are compliant with catheterization schedules, especially when time is taken to explain the alternatives.
Newborn Management

- CIC q6hours, with family teaching
  - Frequency of cathing is decreased if volumes remain low
- No prophylactic antibiotics
  - Except Grade 5 VUR
- RBUS
- Videourodynamic or VCUG + CMG

Subsequent visits

- 1st year of life:
  - Every 3 month office visit & RBUS
  - Urodynamics
  - DMSA
  - Creatinine
- 2nd-5th year of life:
  - Annual office visit & RBUS
  - Urodynamics
  - Creatinine
  - GFR, DMSA (end of study)
Why Repeated Urodynamics?

• Frequent urodynamic evaluation after the initial evaluation is as important, since detrusor-sphincter coordination may change with time.

• There is no consistent correlation between radiological appearance and urodynamic findings.

Take Home Message

• In infants with SB, baseline renal ultrasound demonstrated normal renal parenchyma, and no or minimal hydronephrosis.

• Baseline vesicoureteral reflux is uncommon with no reflux noted in over 90% of children.

• Baseline renal scarring is uncommon, with no scarring in >95% of infants.

• These minimal findings on baseline imaging demonstrate that most infants with SB are born without evidence of kidneys abnormalities.
Take Home Message

• *Early intervention with CIC and antimuscarinics* improves urodynamic parameters and decreases the rate of UTI, VUR, upper urinary tract deterioration, and the incidence of ESRD.

• This underscores the importance of *proactive protocol* to manage urological care in children with SB to preserve renal parenchyma and reduce progression to CKD.

Thank You