

## Daytime Wetting and Voiding Dysfunction in Children

### *What are the symptoms?*

- urge incontinence – your child leaks on the way to the bathroom, often complains of a short “warning” period
- non-specified incontinence – your child leaks without sensation or warning
- urinary frequency – child voids at least every 2 hours (interferes with school)
- lazy bladder – child voids one to three times per day
- frequent urinary infections
- bladder spasms – may cause lower abdominal pain or urge to urinate

### *How does the bladder “normally” work?*

The normal bladder stores urine at very low pressure. When the bladder becomes full, it sends a **signal** of “fullness” to the brain (start looking for a restroom). After 5 minutes to an hour, the bladder sends another signal of “urgency” (you’d better have a restroom nearby). Most people can put off voiding as long as they want without leaking urine.

These **signals** are not pressure spikes or spasms within the bladder. The signals are sent from the bladder to the brain without a change in bladder pressure. When a child decides to void, he/she purposely relaxes the urethral “**sphincter**” (valve) and the bladder contracts on its own. We cannot directly control our bladder. We can control our bladder indirectly by opening or closing the sphincter. When we open our sphincter, the bladder contracts by reflex. Likewise, when we close our sphincter, the bladder stops contracting (this takes a few seconds, so there is a short rise in bladder pressure).

The **coordination** between the sphincter and bladder is very important for normal voiding. Discoordination will lead to increases in bladder pressure. There are four components of normal bladder emptying – a cycle of events (see figure). When the bladder is full, it sends a **signal** to the brain. The child has a sensation or **perception** of fullness, then he/she takes **action** by going to the restroom and relaxing the sphincter. The relaxation of the sphincter leads to a spontaneous contraction of the **bladder**. The four components of this cycle are – signal, perception, action and bladder.

### *What happens during voiding dysfunction?*

There are many causes of voiding dysfunction. An abnormality in one component of the voiding cycle can cause abnormalities in other components and perpetuate itself. Thus, voiding dysfunction is a cyclical problem that may worsen with treatment.

## Signal problems

Abnormal bladders can send late signals, no signals or false signals.

- **Late signals:** Children will complain that the time period between the sensation of fullness and urgency was too short to allow for a restroom break. It is impossible to say whether this is a signal problem or a perception problem.
- **No signals:** This unusual problem is associated with the Lazy Bladder Syndrome (large bladder), to be discussed later.
- **False signals:** If your child has an unstable bladder, then it may be sending false signals. These may be associated with pressure spikes or spasms. One element of diagnosing and treating voiding dysfunction is teaching your child to recognize these signals and/or suppressing false signals (pressure spikes) with medications.

## Perception problems

This aspect is very difficult to study or explain. Perception abnormalities can be behavioral (under the child's control) or developmental (a skill not yet acquired). Have you ever yelled at your child and received no response? It's amazing! We can all hear what we want to hear. Similarly, a child can subconsciously affect his/her perception of bladder signals. Children must learn to recognize the signals from the bladder. Even if your child has been properly potty trained, he/she can regress and learn abnormal voiding. One of the tenets of treating voiding dysfunction is to teach the child how to sense the bladder.

## Action problems

- **No Action or Delayed Action:** The mind of a child is fascinating. Some children will purposely delay voiding because they are "too busy" playing or watching television. Or they don't want to leave the classroom. A common sign of fighting bladder spasms is the child crossing the legs or kneeling down upon the foot. These postures are performed in an attempt to suppress the bladder spasm or signal.
- **Frequent Action:** Some children act upon every bladder signal and void small amounts.
- **Discoordination between the bladder and sphincter:** Some children, consciously or subconsciously close their urethral sphincter while the bladder is contracting. This is a learned behavior that arises in response to pain, leakage or a bladder spasm. When the bladder is not coordinated with the sphincter, the bladder will squeeze urine out when the sphincter is closed. This increased workload makes the bladder become muscular and thickened. This leads to an unstable bladder and infections, which can lead to more infections and more pain, and again more discoordination. This again is an example of a vicious cycle.

## Bladder Problems

The final component of voiding dysfunction is the bladder. A "bad" bladder becomes thickened (muscular) and has involuntary contractions (spasms) that can lead to leakage or pain. All the above problems – signal, perception and action – can be caused by a bad bladder. More importantly, these problems also cause the bad bladder. Thus, the vicious cycle. Occasionally, we treat the bladder with relaxant medications, such as Ditropan, to suppress spasms.

## **Urinary Tract Infections (UTI)**

Many children with voiding dysfunction have a history of UTI. Quite often, UTIs are difficult to treat in children with dysfunctional voiding.

### ***How does the normal bladder prevent infection?***

- Frequent emptying – if there is no urine in the bladder, the bacteria have nowhere to grow
- Complete emptying – residual urine provides a home for bacteria
- Barrier to bacteria – the lining of the bladder usually prevents penetration by bacteria
- Antibodies
- Prevent entry of bacteria – girls and uncircumcised boys are at risk for UTI due to more bacteria around the urethral opening, proper hygiene is very important

### ***How does voiding dysfunction lead to infection?***

Many children with voiding dysfunction do not empty their bladders completely, which leads to residual urine. Incomplete emptying can be due to “rushing” out of the restroom or due to discoordination.

### ***Does a UTI change the work-up or treatment of voiding dysfunction?***

Absolutely. Any child who has had a UTI needs radiologic imaging of the bladder and kidneys to rule out anatomical causes of infection.

## **Bowel Dysfunction – Constipation**

Most children with voiding dysfunction have problems with constipation and/or stool incontinence. The function and control of the bowel is very similar to the bladder. The sphincter of the bowel and urethra are connected and share the same nerves. Quite often, we use the term “Dysfunctional Elimination Syndrome” instead of “dysfunctional voiding”, because it more accurately describes the combined problems of the bowel and bladder. If your child is constipated, this must be relieved before treating voiding dysfunction (ask for the handout on constipation).

## **Work-Up of Voiding Dysfunction**

Elimination History or Diary: record all voiding and defecation episodes and accidents Questions regarding UTI, hygiene, school restrooms ...Other Medical Problems and Family History Physical Examination: abdomen, spine, genitalia and neurologic Urinalysis and/or urine culture We may also evaluate your child's voiding pattern with a Uroflow machine and/or measure the activity of the sphincter with an EMG machine. After voiding, we often check how much urine is left in the bladder (post-void residual) with a small ultrasound machine. None of these diagnostic procedures hurt. Sometimes, we need to evaluate the bladder with a special test called Urodynamics (ask for the handout on this procedure).

## Treatment of Voiding Dysfunction

- Education - Urology Handout
- Behavioral / Motivational Therapy - Positive reinforcement (age appropriate) charts, stickers/stars on a calendar, rewards when symptoms improve.
- Voiding Diary - A chart to record time of void, amount of void, and episodes of incontinence.
- Time Voids - A voiding schedule of every 2 hours during the day and marked on the voiding diary. Your child should be sent to the bathroom at the appointed times without regard to perception of need to void.
- Double Voiding - Have child void at a specific time, then again a few seconds later.
- Bladder Retraining - Taking all the pressure off the bladder requires frequent and complete voiding.
- Treat Constipation - See Handout
- Bladder Relaxants - Medications may be used in addition to other treatments.
- Antibiotics - May be prescribed if child has a history of infection. This may eliminate infection as a cause of voiding dysfunction.
- Biofeedback - The use of electromyographic or pressure readings to provide visual and/or auditory feedback to the patient.
- Electrical Stimulation - Stimulation used to improve stress and urge incontinence.
- Post-void Residuals - Used to assess amount of urine in bladder after voiding.