

Update Management on Continence Care:

“Bladder Dysfunction & Urinary Incontinence in Children”

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Introduction

Urinary incontinence in children, whether occurring during the day or night, is a very distressing condition not only for the child but also for their parents. Over a decade ago, children in many societies were still just expected to be able to achieve urinary continence as they grew older and by the time they started school. Little emphasis had been placed on the problem of persistent wetting and so many a times these children and their parents just kept the problem to themselves. However, increasing interest and research in this area has highlighted the possible social and psychological impact that the condition may have on the child and thus raising awareness among families and clinicians. Our increasing knowledge and understanding of the topic, including the spectrum of possible underlying voiding dysfunctions, has also led to profound changes in its management strategy, which now often involves a multidisciplinary approach and targeted therapy. The first and main part of the

session discusses the prevalence, problems and management of non-neurogenic urinary incontinence in children from a surgeon's perspective and the second part discusses management of neurogenic urinary incontinence.

Definitions and Standardisation of Terminology

With the increasing number of research and published articles involving lower urinary tract function, several new concepts have been introduced with different interchangeable terms. To try to lessen the amount of confusion thus created, the International Children's Continence Society (ICCS) had set up a Standardisation Committee consisting of professionals from different parts of the World to put together a set of guidelines for the use of different terminology for lower urinary tract (LUT) function in children.

Urinary Incontinence: uncontrollable leakage of urine

- applicable after the age at which bladder control is attained or 5 years of age
- continuous (usually associated with congenital malformations) or intermittent
- can occur both day and night

Enuresis: intermittent incontinence which occurs during sleep

- secondary (SNE): dry period for more than 6 months or
- primary (PNE): never dry >6 months

- monosymptomatic: no hx of bladder dysfunction and no other LUT symptoms or
- nonmonosymptomatic: hx of bladder dysfunction/LUT symptoms during the day

Causes of urinary incontinence

- i) Overflow due to chronic retention

- pathological obstruction, DSD, detrusor failure

ii) Insufficient urethral / outlet resistance

- neurogenic or anatomical eg. Epispadias/exstrophy

iii) Diminished bladder storage capacity

- hypocompliant bladders, detrusor overactivity, small bladder

iv) Bypass of normal sphincter mechanisms

- fistula

v) Voiding dysfunction

ICCS Classification of daytime LUT conditions.

Term	Definition
Urge incontinence	Incontinence in the presence of urgency.
Overactive bladder (OAB)	Urinary urgency with or without urinary frequency and/or urge incontinence. Often associated with detrusor overactivity on cystometric evaluation.
Voiding postponement	Daytime incontinence associated with habitual postponement of micturition often by various holding maneuvers. Child has often learned to restrict fluid intake during the day.
Underactive bladder	Voiding by increased intra-abdominal pressure often associated with low voiding frequency and interrupted flow.
Dysfunctional voiding	Voiding against a contracted urethral sphincter resulting in staccato pattern on uroflowmetry.
LUT Obstruction	Characterized by increased detrusor pressure on voiding and a

	decreased urine flow rate.
Stress incontinence	Leakage of urine (usually small amounts) on exertion or with an increased intra-abdominal pressure.
Vaginal reflux	Urinary incontinence (usually moderate amounts) occurring soon after voiding in toilet-trained pre-pubertal girls due to vaginal entrapment of urine.
Giggle incontinence	Almost complete voiding occurring during or after laughing with otherwise normal bladder function.
Extraordinary daytime urinary frequency	Small (< 50% expected bladder capacity) and frequent (> once hourly) voids during the day with normal nocturnal bladder behavior.

Epidemiology and Prevalence in Hong Kong

Overall prevalence of PNE in HK school children = 3.1%

- 20% had both day and night-time symptoms
- Prevalence according to age:

5yrs	16.1%
7yrs	10.1%
9yrs	3.14%
19yrs	2.2%

Study also showed that significant reduction in overall prevalence with increasing age was more evident amongst mild enuretics whereas those with persistent PNE in adulthood tended to have more severe symptoms

- Overall prevalence of PNE in adults (16-40yrs) = 2.3%

Limited local data is available in the literature for the prevalence of daytime urinary incontinence alone in children

- 6.3% amongst Japanese primary schoolchildren 7 to 12 yrs
- 5.5% amongst Australian school children 5 to 12 yrs

Misconceptions and the Development of Bladder Control

- bladder function develops progressively from an infantile voiding pattern to a more voluntary type of micturition during the first 2 to 3 years of life

- active learning process whereby child gradually acquires ability to voluntarily inhibit or initiate voiding at socially convenient times
- dependent on an intact nervous system, a progressive increase in bladder functional storage capacity, maturation of voluntary control over the urethral striated muscle sphincter and development of direct volitional control over the bladder-sphincteric unit
- can be influenced by an awareness of the accepted social norms

Misconceptions:

- delay in the normal maturation of bladder control (hence the belief that these conditions would get better with age)
- child was lazy
- parents' inability to toilet train their child

Hence:

- children feel embarrassed and reluctant to come forward with the problem
- parents do not readily take their children to seek medical advice
- affect on family relationships
- social and psychological impact on the child

Evaluation

- Detailed History**
- ? neurological and congenital abnormalities
 - ? bowel dysfunction

- ? actual urinary symptoms
- ? mental status
- ? family issues

Bladder Diary: Frequency–Volume and Bedwetting Charts

- recordings of daily fluid intake, urine output and bladder related symptoms at home under normal conditions
- include: number of voidings per day, the distribution of voids during the day, the voided volume, episodes of urgency and leakage

Physical Examination

- exclude neurological abnormalities
- ? palpable bladder
- ? external genitalia
- rectal examination

Laboratory Investigations

- urinalysis: ? bacteriuria / glucosuria
- serum and urine osmolality: ? renal concentrating ability

Imaging

Ultrasonogram: - first-line investigation

 - anatomical abnormalities

 - functional problems ?bladder volume, bladder emptying

X-ray spine: - ? spina bifida

MCU: - ? vaginal reflux

-? urethral status

Urodynamic Studies:

- describes the physiological parameters involved during filling and voiding
- bladder filling and storage can then be described according to bladder sensation, detrusor activity, bladder compliance and bladder capacity
- usually reserved for those children with moderate to severe PNE (>3 nights per week) and all children with daytime urinary symptoms

Classification	Description
Detrusor overactivity (DO)	Characterized by uninhibited detrusor contractions during the filling phase.
Primary bladder neck dysfunction (pBND)	Characterized by a marked delay in initiation of urinary flow after onset of detrusor contraction and is often associated with high detrusor pressure but minimal pelvic EMG activity.
Dysfunctional voiding	Characterized by voiding which is preceded with abdominal or pelvic straining and evidence of increased pelvic floor EMG activity. There is marked staccato or interrupted voiding on uroflowmetry.

Management

Paediatric urologists and urotherapists work in close collaboration to derive on an individualized targeted treatment plan for each patient dependent on the assessment and evaluation

Urotherapy

- (i) Behaviour Modification and Standard Urotherapy
- (ii) Biofeedback and Pelvic Floor Rehabilitation
- (iii) Neuromodulation, Acupuncture and Other Treatment Modalities

Bowel Management

- rectal emptying of impacted stool
- maintenance of regular soft stools

Medications:

- ***Desmopressin*** (DDAVP or Minirin): a vasopressin / anti-diuretic hormone (ADH) analogue used to reduce urine production at night. Side-effects are few but desmopressin can cause water intoxication and patients should be cautioned to avoid excessive water intake.
- ***Antimuscarinics*** (e.g. oxybutynin / tolterodine): gold standard in treatment of overactive bladders. Reduces frequency and intensity of involuntary contractions resulting in an increase in bladder capacity. Side-effects of flushing, constipation, dry mouth
- ***Alpha-blockers***: for relaxation of the bladder neck in primary bladder neck dysfunction
- ***Tricyclic antidepressant*** (eg. Imipramine): effective in increasing urine storage by both decreasing the detrusor contractility and increasing outlet resistance. Associated with a high incidence of side effects and their use should be judicious.

Clean intermittent catheterization (CIC)

- decompensated or underactive bladders where bladder emptying efficiency is compromised and upper urinary tract dilatation may exist
- regular emptying of the bladder to achieve low pressure emptying improves detrusor contractility and bladder emptying function

Other specific treatments

Giggle incontinence: cystometry is usually completely normal or occasionally demonstrate some detrusor overactivity. The cause is unknown and these children have no structural anomalies of the genitourinary tract or infection. The diagnosis is based on history. Treatment is notoriously difficult. Anticholinergic drugs may help.

Vaginal reflux: usually diagnosed based on a history of urinary incontinence occurring soon after voiding in toilet-trained pre-pubertal girls and is due to vaginal entrapment of urine. When in doubt, it can be confirmed by performing a micturating cystourethrogram. The condition is harmless and tends to resolve with age but the child may also be taught to empty her vagina by simply voiding with her thighs apart and leaning forward after voiding before getting up.

Surgical Options

Cystoscopy:

- to rule out bladder outlet obstruction eg. PUV
- to reduce urethral/sphincteric pressure by balloon dilatation of the bladder neck / Botulinum A toxin (Botox) injection into the urethral urinary sphincter

Bladder augmentation:

- to help produce a low-pressure system with increased bladder capacity
- very rarely considered in non-neurogenic bladders

Neurogenic Bladder Dysfunction

Myelodysplasia is the most common cause of neurogenic bladder dysfunction in children (incidence: 1 in 1000 births in US)

The neurologic lesion in myelodysplasia is a dynamic disease process in which changes takes place throughout childhood

Normal neurologic function at birth has 32% risk of developing tethered cord with development of DSD +/- DO

Ix:

- Renal USG
- Post-void residual – May need CIC even without UD if poor BEE
- Urinalysis and culture
- Serum creatinine

- DMSA
- MCU
- Urodynamic Study - predictive value for those at risk of future urinary tract deterioration and progressive neurologic change

Need to know:-

any bladder sensation ?

can it store urine ?

can it empty ?

can it maintain continence ?

Is it a safe system ?

Types:-

- Synergy = complete silencing of sphincter during detrusor contraction or maximum filling capacity
- DSD = external sphincter fails to decrease or increases activity during detrusor contraction or sustained increase in intravesical pressure as bladder is filled
(Resultant = poorly compliant bladder with high intravesical pressure)

- Complete denervation = no bioelectric potentials detectable in external sphincter at any time

Outlet obstruction major contributor to deterioration



Poor compliance major role especially when outlet resistance exceeds 40cmH2O

Objectives:

- J Minimize urinary tract infection
- J To protect and safeguard upper tract function
- J To establish regular bladder emptying with complete dryness in between

Mx:

- i) Improve bladder emptying (pharmacological / CIC)
 - Reduce bacterial colonization of the urinary tract
 - Prevent urinary infections
 - Protect upper tracts from damage
 - Reduce incontinence symptoms
- ii) Enhance bladder storage capacity
 - pharmacological eg. Oxybutynin

- surgical eg. Bladder augmentation

- iii) Increase outlet resistance
 - Pharmacological
 - Bladder neck injection (Deflux)
 - Bladder neck reconstruction
 - Bladder neck suspension
 - Artificial urinary sphincter

Bowel management & psychological counseling should always be an integral part of therapy

Surgical considerations:- “Balance pro’s and con’s”

- not suitable for everyone
ie. too young, not motivated

- complications
eg. stomal related, calculi, electrolyte

- satisfactory voiding is rare after augmentation

Summary

- Urinary incontinence is a common condition in children with significant psychosocial impact which should not be ignored. Urinary incontinence may persist into adulthood if left untreated. Educational programs should be

implemented to raise public awareness amongst parents and practitioners so as to encourage patients to seek proper medical advice at appropriate times. Targeted therapy can achieve good results in the majority of cases. In patients with neurogenic bladders our objective is to protect upper urinary tract and to help patient achieve continence and independence as far as possible.