VOIDING DISORDERS

DR. J KAUSMAN

(nb see also Steve McTaggart’s talk from RACP Hobart meeting)
DEFINITIONS

Enuresis: normal void at a socially unacceptable time.
Nocturnal: 15% @ 5yr; 5% @ 10yr; 1 @ 15yr (male>female)
Diurnal: 11yo-12.5% (7% male, 16% female)
    15yo-3% (1% male, 5% female)
Urinary incontinence: Involuntary loss of urine.
PHYSIOLOGY

Sympathetic nerves (T12-L1) ) Bladder fundus, bladder
Parasympathetic nerves (S2-4)) neck and post urethra.

Somatic sacral nerves: ext urethral sphincter.

Symp activation---> detrusor relaxation(β)
    sphincter contraction(α)

P’symp activation---> detrusor contraction
    sphincter relaxation

CNS (Pontine micturition centre, PMC).
Maturation:

1. Bladder capacity
2. Voluntary control of striated muscle
3. Voluntary control of spinal micturition reflex.
   (uninhibited detrusor contractions)

NN- void by sacral spinal reflex
2yo- sense fullness-->modify reflex by PMC.
2-4yo- control voids by ext sphincter/ detrusor coordination.

Pr. to be ready for “kinder” etc.
“Dysmaturation”

1. Holding manoeuvres --> detrusor instability

2. Voluntary contraction of ext sphincter--> detrusor-sphincter dyssynergia--> can’t relax sphincter to void.
Anatomy of micturition  A simple way to remember the causes of established urinary incontinence is this diagram of the bladder and outlet/sphincter. Only four possible things can go wrong: either the bladder is overactive or underactive, or the outlet does not remain closed when it should or is obstructed.
Fig. 11-1. Schematic of normal coordinating voiding (A) and dysfunctional voiding (B). (Courtesy of the National Kidney Foundation of Texas. A Parent's Primer to Normal and Abnormal Voiding in Children, Dallas, TX)
DIAGNOSTIC EVALUATION —

History
Physical examination
Voiding diary
Urinalysis
Post-void residual testing

These are often sufficient to provide a working diagnosis and basis to plan initial therapy.

Specialised testing may assist ie urodynamics/cystometry
Spine imaging as necessary.
History
Developmental.
Voiding
Perineal hygiene- vulvitis/ balanitis
Toilet-training
Bowel function (impaction can cause overflow urinary incontinence, and bowel control shares sacral cord innervation with voiding).
Status of other medical conditions and symptoms, including UTI.
Recent psychosocial stressors.
Voiding history

leakage - frequency, volume, continuous volume

timing - pre/ post micturition (vaginal)

stream - strength, straining, dribbling

bladder sensation

precipitants (eg, medications, physical activity, cough, laughing, sound of water).

associated symptoms (urgency, posture) --> holding manoeuvres.
PHYSICAL EXAMINATION

Renal masses
Bladder
Constipation
Perineum
Genitalia
Neurology
Spine
Lower limbs
Voiding record

It provides useful diagnostic and therapeutic clues such as:

- usual timing and circumstances incontinence
- modal voided volume (amount of urine per void, a proxy for the functional bladder volume)
- voiding and urinary incontinence frequency
- sensation at time of void
- total daytime and nocturnal urine output.
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VOIDING RECORD

NAME: ____________________________
Age: _______ Date of Birth: ____________ Today’s Date: ____________

Urinary Complaints:
Infection, wetting (day/night), burning, frequency
Age of toilet training:
Number of times child voids/24 hrs: 1-3 4-6 6-8 more
Other problems:

Bowel Problems:
Number of bowel movements/week:
Soiling underwear (skid mark, formed stool): Yes No
Number of accidents/week:
Other bowel problems:

Medicines:
Drug Allergies:
Other Medical Problems:

Please include volume of urine, if measured, and any associated symptoms.
(v=void, a=urinary accident, BM=bowel movement, s=bowel accident)

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Other tests

Urinalysis: exclude UTI, DM, GN, (osmolality)

Renal and bladder U/S.

   Post-voiding residual: simple U/S scan. Urology nurse does this with bladder scanner in O/Pt’s.

   Normal vol = (age +2) *30

   Residual vol = <15ml or <10% capacity

Cystometry/ urodynamics

A-P/ Lat XR or MRI L-S spine

IVP/ Cystoscopy if ?ectopic ureter
Types of Urodynamic Studies and Measurements

- Documentation of objective evidence of incontinence upon provocation
- Volume at first desire to void
- Intravesical, urethral, abdominal pressures during bladder filling and voiding
- Calculation of detrusor pressure
- Urine flow rate
- Residual bladder volume
- Leak point pressure
- Pressure flow studies relating flow rates to changes in pressure during bladder emptying
- Surface electromyography to indirectly measure pelvic floor and sphincter muscle contractility
- Videourodynamics to combine routine urodynamic studies with X-ray or ultrasound imaging
- Ambulatory urodynamics to evaluate patients while they perform their usual activities
CYSTOMETRY

Measures bladder pressure during bladder filling:

detrusor activity and bladder sensation

capacity, and compliance.

One channel- bladder pressure alone

additional channel simultaneously measures abd pressure through the rectum or vagina.

(discriminates between changes in abdominal versus bladder pressure)
Normal observations and results

The normal bladder:

- no contractions during filling
- initially expand without resistance.

Urethral sphincter should relax and open when the patient wants to initiate voiding, accompanied by detrusor contractions.

During voiding, detrusor contraction should be smooth and lead to a steady urine stream.

Test results must correlate with symptoms to be meaningful.
Causes of Bladder dysfunction

1. CNS: Spinal, Brain/ brain-stem (neuropathic bladder)

2. Structural: ureter, bladder, urethra

3. Acquired patterns of daytime wetting
   - Urge syndrome (Detrusor overactivity/ instability)
   - Dysfunctional voiding (DSD)
   - Giggle micturition
   - True diurnal enuresis
   - Post-void dribbling

4. Pollakiuria
FUNCTIONAL DISORDERS

Urge syndrome

A filling defect.

Detrusor hypertonicity: lowered sensory threshold to contraction. Often follows (rec) UTI. If dysuria, may lead to holding on--> outflow obstruction: increases risk of UTI and detrusor instability. “Spinning-top urethra”- ext sphincter contracting against contracting bladder.

Detrusor overactivity
Intermittent contractions.
Elevated Pr.s
Pelvic floor contractions prevent voiding (EMG).
DETRUSOR-DYSSYNERGIA S (DDS).

- The International Continence Society (ICS) defines detrusor overactivity (DO) as spontaneous or provoked bladder contractions during the filling phase of cystometry.
- Involuntary detrusor contractions may be asymptomatic or may cause urgency, frequency, nocturia, and incontinence.
- Attacks increase from late am- peak in afternoon.
- Very common, esp 5-7 yo age gp.
- FHx common.
- Constipation!
DIAGNOSIS

Cystometry is the objective way.
Presumptive diagnosis:
  - history, physical examination
  - voiding diary
  - postvoid residual (small)
  - urine culture, and urinalysis
This is adequate to begin conservative treatment.

Voiding diary shows unpredictable, intermittent pattern.
Rx of urge syndrome

Bladder retraining: education (Pelican Diary)
scheduled voiding
positive reinforcement

   Important: increase awareness! Wiping after voiding.
   Central control of detrusor vs pelvic m contraction.

Good fluid intake (increase bladder capacity)
Anticholinergics
Antibiotics: keep infection-free, wiping (avoid vulvitis)
Bowel management
Teasing/ Secondary behavioural consequences.
BLADDER TRAINING

Voiding schedule with progressively increasing intervals between each void.
Bladder diary allows realistic initial goal.
EG if diary shows voiding every 30 to 45 minutes, start with a voiding schedule every 60 minutes. Follow this schedule regardless of urge.
The schedule continues for two weeks or until the patient feels comfortable with the initial interval goal, at which time the interval is increased by 15 to 30 minutes.
**MEDICATIONS**

**Oxybutynin** — (Ditropan) relaxes bladder smooth muscle primarily by blocking muscarinic receptors. It has minimal spasmolytic and local anaesthetic properties at clinical dosage levels. Side effects common (17%) eg. dry mouth, blurry vision, constipation, tachycardia. Onset at 1 hr, peak at 3 hrs.

Alt’s: propantheline, tolterodene

Controlled-release oxybutynin (daily).

**Imipramine** improves bladder storage through anticholinergic, antihistaminic, and local anaesthetic properties. It also increases urethral resistance by peripheral blockade of noradrenaline uptake.
Dysfunctional voiding (Detrusor ext Sph Dysynergia)

A holding/voiding defect.

Learned behaviour from voluntary attempts to suppress micturition by contracting pelvic floor muscles and thereby closing external urethral sphincter (DSD).

Staccato- rhythmic pelvic floor contractions at high flow rate. Prolonged void, incomplete void.

Fractionated- Several small fractions, incomplete void. Detrusor hypoactivity, increased capacity. Infreq voiding, overflow.

End of spectrum, very poor contractions, but clinically very poorly defined……..
Lazy bladder S.

Psychologic non-neuropathic bladder.

Occult neuropathic bladder.

Non-neurogenic neurogenic bladder.

Pseudoneurogenic bladder.

Hinman S. (‘failure personality’/ ‘delayed maturation/ regression’):
Child neurologically normal and normal neuroimaging.

=Long term outcome. No detrusor contractions. Abdominal Pr drives voiding (straining).

At risk of all Cx’s as neuropathic bladder (like in SB)--->needs Rx!
Upper tract dilatation, Renal failure, UTI’s, encopresis.
Dyssynergic voiding.
Elevated, sustained bladder Pr.s.
Intermittent pelvic floor contractions.
Break-thru voiding.
En-route to “Lazy bladder S.”
Overflow incontinence

Overflow leakage is due to detrusor weakness and/or bladder outlet obstruction. Leakage typically is small volume, but can lead to significant wetting.

The postvoid residual is elevated, and there may be a weak urinary stream, dribbling, intermittency, hesitancy, frequency, and nocturia.

Stress-related leakage may be apparent, reflecting an otherwise intact sphincter mechanism overwhelmed by the large bladder volume.
Associated:

1. “milk-back” leads to UTI --> detrusor instability --> incontinence. (esp with VUR)

2. Constipation/ soiling.

U/S: dilated upper tracts, trabeculated large bladder, high residual.

Rx: Toileting - posture (pelvic floor ie bowel and bladder)

Frequent timed/ double voiding --> CIC.

Behavioural Rx.

Biofeedback in some centres.

Antibiotics as necessary. Constipation Mx.

Hinman S.: Psychosocial, ? Bethanecol/ anticholinergic
MONITORING OUTCOME (esp CIC)
Preserve renal function
Continence
UTI’s.
--> ?circumcision.
Measure residuals--> trial off CIC.
Greatest risk of renal deterioration is in group with reflux, recurrent UTI and DSD.
Biofeedback training

Biofeedback training uses a visual or auditory signal to give the patient information about physiologic processes that are normally unconscious.

Perineal skin and vaginal or anal electrodes --> voluntarily contract the levator ani muscle and the external anal and urethral sphincters in response to a sense of urinary urgency or a rise in bladder pressure. Interactive computer games.

Contraction of these muscles causes reflex inhibition of the bladder.
Central failure to inhibit bladder contractions

Holding manoeuvres

Dissipation of detrusor contraction

Incomplete relaxation or overactivity of pelvic floor muscles during micturition

Detrusor-sphincter dyscoordination

Functional bladder outflow obstruction

Staccato voiding

Fractionated voiding

Urgency Syndrome

Detrusor Contraction during Bladder Filling

Sensation of Urgency

Pelvic floor used as "emergency brake"

Incontinence

Holding manoeuvres

Dissipation of detrusor contraction

Lazy Bladder Syndrome
Giggle incontinence (enuresis risoria)

Isolated or part of detrusor instability/ dysfunctional voiding syndromes.

Specific to laughter- initiates full micturition.

Onset before puberty--> improves with age.

?maturational CNS change.

Rx- behavioural, ?anticholinergic.
Diurnal enuresis

Usu boys who hold on too long --> complete void incontinence.

Normal bladder function.

Rx: behavioural.

Post-void dribbling

“vaginal voiding”

Rx- posture, double voiding.

Keep perineum dry.
Pollakiuria: extraordinary daytime urinary frequency

No incontinence! No dysuria!

Daytime only. Up to every 5-20 min.

Previously toilet-trained. Pre-school age.

Benign, self-ltd (1-4wk).

Cause: ?anxiety induced.

Urine and U/S Normal.

Rx: reassurance, med’s don’t help.
NOCTURNAL ENURESIS

Exclude:  daytime urgency/ stress

daytime wetting (25%)

constant dribbling

UTI

Chronic ill health/ polydipsia/ LOW

Rx:  Nil (15% annual natural remission)

Behavioural/ rewards

DDAVP (peak 40-60min, duration 10-12hr)

Alarm (2/3 dry--> >2/3 stay dry) Usu >7yo.

Both: higher success.
A WORD ON CONSTIPATION/ ENCOPRESIS

IMPORTANCE IN VOIDING DISORDERS

?Causal

Definitely associated

Definitely perpetuates - physical, psychological

Some overlap in Mx - behaviour, posture, fluid intake

Generally, treat bowel before bladder.

AND...COULD BE A PART OF A LONG CASE!!!
CONSTIPATION MX

Education- parent, child ("Mummy My Poo’s Stuck!").

Scheduled sitting. DIARY!

Toileting posture (Sit tall, fat tummy, slippery slide)

Positive reinforcement

Diet

Fluids

Laxatives- which one(s)? How long?

Psychological support/ bullying Mx

Plan for soiling break-throughs, anal fissures, intercurrent infections
SITTING ON THE TOILET!

1. Have an anterior pelvic tilt
2. Have a relaxed Rectus Abdominis
3. Increase abdominal pressure by using the Oblique muscles

TIPS - Encourage the children to:
1. Make their backs like slippery dips (gets the anterior pelvic tilt)
2. Bulge their tummies (relaxes the rectus abdominis)
3. Make snake noises (brings in the obliques)
RESOURCES

Zelia Joy (outpatients)

Diaries: Pelican, Fitness Training

1 Step At A Time (toilet-training disabled children)

Stomal therapist- CIC

Physiotherapist
CASE 1

6 YO GIRL GENERALLY WELL.
Toilet-trained at 4 yrs.
Mild recurrent UTI’s (3 episodes) since last year. No admissions to hospital.
Urinary frequency and occasional wet nickers.
Renal U/S normal.
Constipation, no encopresis.
Dx: common wetter. Urge syndrome/ detrusor instability.

Rx: 1. UTI -Rx
   - prophylaxis (3 mths in first instance usu)
   - nitrite dipstix and big dose if positive
     (later, once proven infection free)
   - if pubertal girl address sexual activity

2. Detrusor- Oxybutinin 2.5mg dose
   3-6 mths in first instance.
   Trial and error dosing: strength and freq

3. Pelican diary, bladder training, scheduled void

4. Constipation ? JUST Rx this and R/v.

5. Psychosocial
CASE 2

8 yo boy- UTI
PHX: CP- MICROCEPHALY
EPILEPSY
OPTIC NERVE HYPOPLASIA
Renal U/S- small scarred R kidney, hypertrophied L kidney with moderate HN. Residual 150ml.
MAG3: R-19%, L-81%, GFR-13ml/min
DMSA: B/L scars, worse on right
Creat- 0.07mol/L
Cystoscopy- large hypotonic bladder
CMG- 400ml-30cm Pr, 500ml- 40cm Pr.
**Dx:** “neuropathic bladder” --> high volume, poor emptying

**Rx:** Regular catheterisation (CIC)

HOW? Per urethra if tolerated

   Via conduit eg mitrafanoff

At 5 yrs, Creat 0.08, CIC 2-3 per day.
CASE 3

Previously well 8 yo boy
Noted by teachers to need to go to toilet every 1-2 hrs for the last 2 weeks.
Not c/o dysuria. Definitely no wetting.
Drinks well.
Normal examination apart from some constipation.
Voiding chart:
  8am to 4pm- passes 25-120 ml every 1-2 hrs.
  Always feels ‘fine’, not busting dry for up to 6 hrs O/N.
Urine NAD.
Dx: Pollakiuria, extraordinary urinary frequency syndrome
Rx: Constipation, reassurance, anxiety
Expect spontaneous resolution, but may take up to 2 months, usually few weeks.
CASE 4

14 yo girl with diurnal and nocturnal wetting. Many years. Occasional UTI’s. Antibiotic Rx intermittently. Occasional urgency, but usually strains to void, 2-3 times per day.

Urine: UTI.

U/S: Small trabeculated bladder: cap- 250 ml, residual- 100ml
Bilateral hydroureteronephrosis
Creat 0.14 mmol/L.
Dx: Non-neuropathic neuropathic bladder/ Hinman S.

Confirm Dx with spine MRI first.

High pressure, poorly compliant bladder causing HN and ureteric dilatation if not catheterised.

Rx: UTI
    CIC
    Constipation
    Psychosocial
and for all those about to sit the U NO WOT

GOOD LUCK

BON CHANCE

BUENA SUERTE

BEHATZLACHAH