

# NEUROGENIC BLADDER

## Introduction

Neurogenic bladder can develop as a result of a lesion at any level in the nervous system, i.e. cerebral cortex, spinal cord, or peripheral nervous system. However, the commonest cause of neurogenic bladder is spinal cord abnormalities.

### Multi-disciplinary approach

Children with spinal dysraphism require care from a multidisciplinary team consisting of neurosurgeon, neurologist, orthopedic surgeon, rehabilitation specialist, neonatologist, nephrologists, urologist and other allied medical specialists.

Long-term follow-up is necessary since renal or bladder function can still deteriorate after childhood.

Children with the conditions listed in table 1 can present with various patterns of detrusor sphincter dysfunction within a wide range of severity, not predicted by the level of the spinal cord defect.

Table 1. Causes of neurogenic bladder

open spinal dysraphism (meningocele, myelomeningocele and lipomyelomeningocele) occult spinal dysraphism (spinal bifida occulta) anorectal agenesis, sacral agenesis spinal trauma spinal cord tumors transverse myelitis
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The commonest cause of neurogenic bladder is lumbosacral myelomeningocele. At birth, the majority of patients with lumbosacral myelomeningocele have normal upper urinary tracts, but nearly 60% of them develop upper tract deterioration due to infections, bladder changes and reflux by 3 years of age. Progressive renal damage is due to high detrusor pressures both throughout the filling phase (poor compliance bladder) as well as superimposed detrusor contractions against a closed sphincter (detrusor sphincter dyssynergia).

### Aims of management:

- preserve upper renal tracts and renal function
- achieve urinary continence
- develop sense of autonomy and better self esteem

### Open spinal dysraphism

Early management with clean intermittent catheterization (CIC):

- aim is to create a low-pressure reservoir and ensuring complete and safe bladder emptying with clean intermittent catheterization.
- CIC should be started once the myelomeningocele is repaired starting CIC in early infancy has led to easier acceptance by parents and children and reduced upper tract deterioration and improvement in continence

### Timing of urodynamic study

Urodynamic study is indicated in *all* children with neurogenic bladder. However due to limited availability, urodynamic study should be carried out in children with neurogenic bladder with the following:

- recurrent UTI
- thickened bladder wall
- hydronephrosis
- raised serum creatinine
- incontinence despite CIC

In infants with lumbosacral myelomeningocele with any of the above conditions and who have been started on CIC, anti-cholinergic e.g. oxybutinin (0.3-0.6 mg/kg/day in 2 to 3 divided dose) should be started even if urodynamic study is not available.

#### *Clean intermittent catheterisation*

- children, as young as 5, have learnt to do self-catheterization
- patients are taught catheterisation in hospital by trained nurse/doctor
- the rationale and benefits of intermittent catheterisation are explained, and the patient is reassured that it should be neither painful nor dangerous
- patients are taught to catheterise themselves lying down, standing up, or sitting on a lavatory, chair, or wheelchair

#### *Complications of CIC*

Urethral trauma with creation of false passages, urethral strictures and bacteriuria.

*Table 2. Clean intermittent catheterisation*

#### **Technique of clean intermittent catheterisation**

##### *Procedure*

1. assemble all equipment: catheter,  $\pm$  lubricant, drainage receptacle, adjustable mirror
2. wash hands with soap and water
3. clean the urethral orifice with clean water.

##### *In boys:*

1. lift penis with one hand to straighten out urethra.
2. lubricate the catheter, with local anaesthetic gel (lignocaine) or K-Y jelly.
3. use the other hand to insert the catheter into the urethra. There may be some resistance as the catheter tip reaches the bladder neck.
4. continue to advance the catheter slowly using gentle, firm pressure until the sphincter relaxes.

##### *In girls:*

1. the labia are separated and the catheter inserted through the urethral meatus into the bladder.

##### *For both males and females*

1. the catheter is inserted gently until the urine flows.
2. the urine is collected in a jug or bottle or is directed into the lavatory.
3. once the urine has stopped flowing the catheter should be rotated and then, if no urine drains, slowly withdrawn.
4. wash hands on completion of catheterization
5. catheterise at the prescribed time with the best available measures

##### *Size of catheters*

Small babies: 6F

Children: 8-10F

Adolescence: 12-14F

##### *How Often to Catheterise*

Infants: 6 times a day

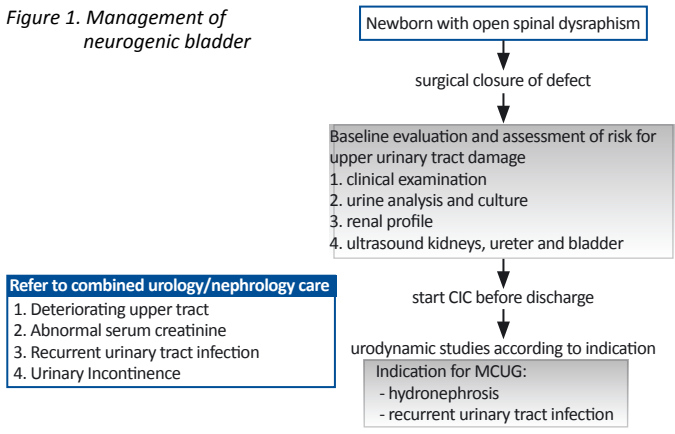
children: 4-5 times a day, more frequently in patients with a high fluid intake, and in patients with a small capacity bladder.

##### *Reuse of catheters*

1. catheters can be re-used for 2 to 4 weeks
2. after using the catheter, wash in soapy water, rinse well under running tap water, hang to air dry and store in clean container.

*Note: In infants with myelomeningocele, management is directed at creating a low-pressure reservoir and ensuring complete and safe bladder emptying with clean intermittent catheterization. CIC should be started once the myelomeningocele is repaired. Starting CIC in early infancy has led to easier acceptance by parents and children and reduced upper tract deterioration and improvement in continence.*

Figure 1. Management of neurogenic bladder



#### Recurrent urinary tract infection (UTI) and antibiotics

- prophylactic antibacterial therapy is not recommended as therapy *does not decrease* the incidence of clinical infections
- asymptomatic bacteriuria are common but does not require treatment
- all febrile UTIs should be treated with antibiotics as soon as possible
- children with recurrent symptomatic UTI should be given prophylactic antibiotics and may benefit from circumcision

#### Management of bowel incontinence

- laxatives: mineral oil, lactulose, enema
- aim to achieve regular and efficient bowel emptying regimen

#### Follow up assessment

- voiding chart: timing of daytime and night-time voiding, volume of each void, and incontinence and urge episodes
- constipation and fecal incontinence
- monitoring of blood pressure, urinalysis, renal profile
- urine culture in suspected febrile UTI or symptomatic UTI
- serial ultrasound imaging at regular intervals depending on the age and baseline ultrasound findings. Infants and younger children require more frequent ultrasound scans up to 3 to 6 monthly

#### Occult spinal dysraphism

- may present with cutaneous stigmata (hairy tufts, skin tags, lumbosacral subcutaneous masses and haemangiomas)
- spinal ultrasound can be used in neonates and infants, optimally before 6 months of age, when ossification of posterior elements prevents an acoustic window. After 6 months of age, the imaging modality is MRI of spine.

#### Other conditions that lead to neurogenic bladder

- start CIC in patients with acquired neurogenic bladder with urinary retention, recurrent urinary tract infection and/or hydronephrosis