Neurogenic bladder, timing of treatment

Urotherapy & Urodynamics course

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Conflict of Interest



Professional Obligations Personal Gains or Interest





Content

- Neurogenic bladder causes in children
- Treatment goals
- Tools to distinguish safe from hostile bladders
- Treatment options:
 - Intrauterine neural tube defect closure
 - CIC
 - Anticholinergics/Mirabegron
 - Botox
 - Bladder augmentation/catheterisable channel
 - Bladder outlet procedures
- Urinary tract infections and CIC
- Sexuality and fertility
- Timing of treatment, when to start (or stop)





Neurogenic bladder causes



Suprapontine lesion

- History: predominantly storage symptoms
- Ultrasound: insignificant PVR urine volume
- · Urodynamics: detrusor overactivity



In children, mostly myelodysplasia (incidence 9.1/10000 births), such as myelomeningocele (lumbar 26%, sacral 20%, lumbosacral 47%)

Spinal (infrapontine-suprasacral) lesion

- History: both storage and voiding symptoms
- Ultrasound: PVR urine volume usually raised
- Urodynamics: detrusor overactivity, detrusor-sphincter dyssynergia



Other causes, such as sacral agenesis, anorectal/cloacal malformations, traumatic/neoplastic spinal lesions









Spinal fluid

TYPES OF SPINA BIFIDA





Treatment goals





Prevent upper urinary tract deterioration

- historically: 50% MMC pts died <35yrs, mostly due to renal failure
- recently: still 25% renal damage and 1.3% renal failure in adulthood



Achieving (social) continence at an appropriate age

Quality of life as good as possible (bladder, but also bowel and sexual function)





Safe or hostile bladder?

(Video-)urodynamics (ICCS standard)

- 2-3 months after spinal shock phase (defect closure), thereafter minimum annually but dependent on clinical situation
- Directly after birth when intra-uterine defect closure
- No normal values in newborns
- Check for capacity, reflux, compliance, detrusor overactivity, detrusor-sphincter dyssynergia
- Peripubertal changes occur often (
 ⁽capacity, detrusor pressure and leak pressure)









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Safe or hostile bladder?

DMSA scan to detect renal scarring

- Baseline scan in first year of life
- High correlation scarring and hypertension (46% of MMC pts have scarring later in life)

Renal ultrasound

 Hydronephrosis, residual bladder urine and dilated ureters, bladder stones







Kidney function

- Serum creatinine levels, measurement of GFR
- Cystatin C as alternative in muscle wasting



Intra-uterine defect closure



Conflicting data on restoration of bladder function:

- MOMS trial: no difference in CIC need after 30 months
- Two series (75 and 82 pts) showed less incontinence after fetal repair and a subset (32%) of patients with a normal bladder function
- However, multiple series showed a degredation in time of bladder function from normal to neurogenic
- Close follow up with urodynamics mandatory



Clean intermittent catheterisation

EAU/ESPU guidelines recommend starting CIC directly after birth and defect closure

- ↓ renal complications
- ↓ need for bladder augmentation later in life
- Easier for caregivers to learn and patients to accept

If clearly no outlet obstruction after closure, CIC may be delayed but closely monitored, ultimately 90% of patients will perform CIC

Trend towards hydrophilic catheters





Anticholinergics/mirabegron



Anticholinergic medication reduces detrusor overactivity and lowers intravesical pressure

- Oxybutinin 93% success, only on-label drug
- Side effects: dry mouth, flushing, blurred vision and heat intolerance
- Intravesical/transdermal administration
- Off-label: tolterodine, solifenacin, fesoterodin etc

Early prophylactic treatment \downarrow renal deterioration and need for bladder augmentation

Mirabegron effective and safe in older children and adolescents





If refractory to oxybutynin or (progressive) upper tract damage \rightarrow suburothelial injection of botox 200IE

- Continence 32-100%
- Pdetmax ↓ 32-54%
- Bladder capacity ↑ 27-162%
- Compliance ↓ 28-176%

Also after failed/in combination with augmentation cystoplasty





Bladder augmentation/CIC channel

After failed botox treatment ileal or colonic cystoplasty can be performed (gastric segments should be avoided)

- Complication rate 30%, 13% reoperation
- Long term: bladder rupture 6.4%, ileal obstruction 10%, bladder stones 36%, pyelonephritis 33% and re-augmentation 13%
- Acid imbalance, ↓ vit B12, diarrhoea and secondary malignancies (followup cystoscopy?)

A catheterisable channel may be offered simultaneously if urethral CIC is impossible/undesirable (long term revision 50-60%)

If possible, a ureterocystoplasty can be performed but re-augmentation rate is high Auto-augmentation and tissue engineered cystoplasty are considered experimental





Bladder outlet procedures



Fascial sling (mostly autologous) to ↑ bladder outlet resistance

- Continence rate 40-100%, >30% with augmentation/CIC channel
- Artificial slings in girls with CIC urethral high complication rate, in males less so
- Botox necessary in >30%, since 50% develops upper tract damage over time

Artificial urinary sphincters on bladder neck 83% continence with spontaneous voiding. CIC through the sphincter high erosion rates (29%) and 100% revision over time

Bladder neck reconstruction in MMC gives high re-operation rates around 70%

Bulking agents are safe, albeit not successful (10-40%)

Bladder neck closure with CIC channel (and augmentation) needs close follow-up for stones and renal damage, with fistulas up to 15%



Urinary tract infection and CIC

UTI are common in neurogenic bladder patients

Continuous antibiotic prophylaxis does not protect against symptomatic UTI or renal scarring, but is still often used

Asymptomatic bacteriuria in 42-76% of CIC patients, no medical benefit of CAP in neurogenic patients on CIC

High-grade reflux with recurrent UTI is an indication for CAP and treatment could include anticholinergics/botox, CIC and augmentation

If augmentation is performed in high-grade reflux at low pressures ureteral reimplantation should be considered, as endoscopic treatment has 75% failure





Sexuality and fertility



Patients with MMC do have sexual encounters, although only 51% of MMC is sexually active as compared to 99% of an adult control group

Pregnancy rates of MMC patients are increasing, with caesarean section in 52% and higher risk for infant and mother peripartum

10 times higher doses of folic acid protect during conception for MMC development

Erectile function is dependent on level of lesion (below L3) and PDE5-I can increase rigidity

Bear in mind, sexual abuse is highly common in physically and/or mentally disabled (during life females 61%, males 23%), especially so in care homes

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Timing of treatment

Stop anticholinergics if possible, as long term use may be associated with an increased risk of dementia, replace for botox and/or mirabegron

Botox in children is on the OR, but in adolescence it is shifted to outpatient clinic

Stop continuous antibiotic prophylaxis, replace with active bladder irrigation using tap water

(Video-)urodynamic control of bladder function

- (bi-)annually in pediatric setting
- Change in symptomatology (tethering?)
- control treatment changes



Thank you for your attention!



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