Advances in the Treatment of Neurogenic Detrusor Overactivity

Clinical Compendium

- Neurogenic bladder (NGB) is a condition in which problems with the nervous system affect the bladder and ability to urinate in a coordinated, controlled fashion.[1]
- NGB is always related to another medical condition such as Parkinson's disease, stroke, multiple sclerosis, cerebral palsy or encephalitis. In children, NGB most commonly stems from a birth defect such as spina bifida.[2]
- Neurogenic detrusor overactivity (NDO) refers to overactivity of the bladder wall muscle, which normally relaxes to allow storage of urine. This results in sporadic bladder muscle contractions, increasing pressure in the bladder and and descreasing the volume of urine the bladder can store. [3]
- If untreated, increased pressure on the bladder risks harm to the upper urinary tract, including permanent damage to the kidneys.[3]
- Patients suffering from NDO experience spontaneous bladder muscle contractions leading to unexpected and frequent leakage of urine with symptoms of urinary urgency, frequency and incontinence.[3]
- Among children, spina bifida is the most common cause of NDO as more than 90% of patients with spina bifida experience urinary dysfunction.[4]

Treatment Goal: Optimize the **KIDS**

Improve Patient's Quality of Life! ←

Kidneys - make sure they stay safe
Infections - keep the urinary tract and kidneys infection-free
Dryness - reduce NDO and bladder pressures to improve continence
Social independence - encourage children to be more proactive in their care

Common Medications for NDO in Pediatric Patients[5]

Agent	Form	Dosage	FDA Approval?
Antimuscarinics			
Solifenacin	Oral	5-10 mg per day	✓ May 2020 for NDO in children age 2 and older
Oxybutynin	Oral	Up to 30 mg/day	✓ Feb 1992 for NDO in children age 6 and older
Darifenacin	Oral	7.5-15 mg once daily	Off-label usage
Fesoterodine	Oral	4-8 mg once daily	Off-label usage
Beta-3 Agonists			
Mirabegron	Oral	25-50 mg once daily	✓ March 2021 for NDO in children age 3 and older
Neurotoxins			
Onabotulinu toxin A	Injection	200 units	✓ Feb 2021 for NDO in children age 5 and older
Abobotulinum toxin A	Injection	500-1000 units	Off-label usage

Assessing Treatment Response

- Therapeutic response will dictate treatment strategy
- **Nonresponse:** No change in number of episodes.
- **Partial Response:** Some decrease in the number of episodes, some decrease in bladder pressure... but patient isn't to the point the clinician wants them to be.
- **Up to 30% of patients on antimuscarinic therapy will experience "no or only slight" improvement!**

Anticholinergic Burden

Clinicians should be mindful of common side effects of antimuscarinic medications such as:

- Dry mouth
- Urinary retention
- Constipation
- Behavioral changes / mood alterations

1. Cleveland Clinic. https://my.clevelandclinic.org/health/diseases/15133-neurogenic-bladder. **2.** Yale Medicine. https://www.yalemedicine.org/conditions/pediatric-neurogenic-bladder. **3.** Haab F. Neurourology and Urodynamics 33:S2–S5 (2014). **4.** University of California San Francisco. https://urology.ucsf.edu/patient-care/children/spina-bifida/myelomeningocele/neurogenic-bladder#.YdzCJ1IOkQ8. **5.** FDA approval database, product prescribing information. **6.** Ghezzi E, et al. Sci Rep 11, 219 (2021).

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