

# EAU GUIDELINES ON NEUROGENIC LOWER URINARY TRACT DYSFUNCTION

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## Introduction

NLUTD (neurogenic lower urinary tract dysfunction) may be caused by diseases and events that affect the nervous systems controlling the LUT. The resulting LUTD depends grossly on the location and the extent of the neurological lesion.

## 1. Classification

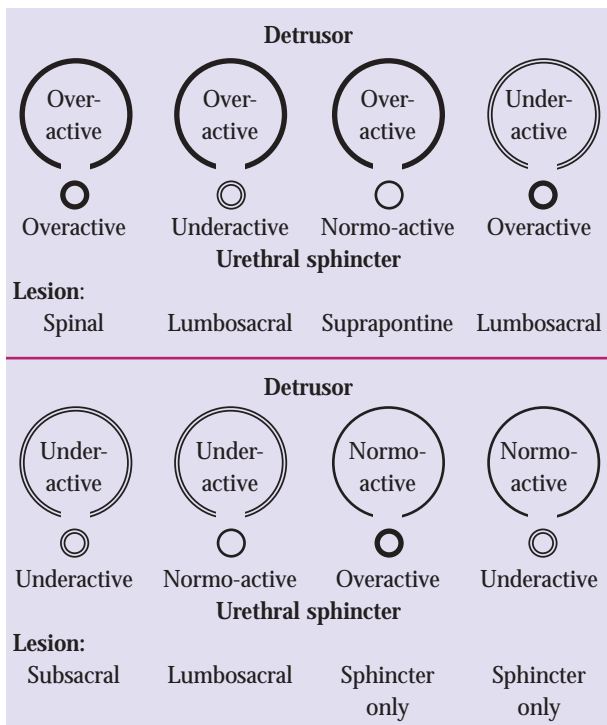
Classification of NLUTD aims to facilitate the understanding and management of NLUTD and to provide a standardized terminology of these disease processes. The normal LUT function depends on neural integration at, and between, the peripheral, spinal cord, and central nervous systems. The gross type of NLUTD is dependent on the location and extent of the lesion:

- suprapontine or pontine
- suprasacral spinal cord
- subsacral and peripheral.

Various functional classifications systems have been suggested, but it is recommended that the very simple classification system according to therapeutic consequences devised by Madersbacher should be used in clinical practice (Figure 1). It is based on the clinical concept that the important differentia-

tion in diagnosis is between the situations of high and low detrusor pressure during the filling phase and urethral sphincter relaxation and non-relaxation or DSD during the voiding phase. A non-relaxed sphincter or DSD will cause high detrusor pressure during the voiding phase.

Figure 1. Functional classification system with typical neurogenic lesions.



## 2. Diagnosis

Both in congenital and in acquired NLUTD, diagnosis and treatment should be performed as soon as possible, as irreversible changes may occur, particularly in children with myelomeningocele and patients with traumatic spinal cord injury, even if the related neuropathologic signs may be normal. It must also be remembered that LUTD, by itself, may be the presenting symptom for neurological pathology.

**Guidelines** for timing of diagnosis, for history taking, and for physical examination are given in table 1. A list of particularly important items in the general history is presented in table 2.

### Table 1. Guidelines for timing, history taking and physical examination.

Diagnosis and treatment in NLUTD should be performed as soon as possible.

#### History

1. An extensive general history is mandatory, concentrating on past and present symptoms and the conditions for urinary, bowel, sexual, and neurological functions, and on general conditions that might impair any of these.
2. Special attention should be paid to the possible existence of alarm signs, such as pain, infection, hematuria, fever, etc., that warrant further specific diagnosis.
3. Specific history should be taken for each of the four mentioned functions.

#### Physical examination

1. Individual patient handicaps should be acknowledged in planning further investigations.
2. The neurological status should be described as completely

as possible. Sensations and reflexes in the urogenital area must all be tested.

3. The anal sphincter and pelvic floor functions must be tested extensively.
4. Urinalysis, blood chemistry, imaging, free flowmetry and residual, and incontinence quantification should be performed.

### **Table 2. Important aspects of history in NLUTD**

- Congenital anomalies with possible neurological impact
- Metabolic disorders with possible neurological impact
- Preceding therapy, including surgical interventions
- Present medication
- Lifestyle factors such as smoking, alcohol, or addictive drug use
- Infections of the urinary tract
- Quality of life.

### **Urodynamics**

Urodynamics provide the only objective method of assessing LUT function. Urodynamics is particularly useful in patients with NLUTD, particularly in detrusor overactivity. Guidelines for urodynamics and uro-neurophysiology are given in table 3.

### **Table 3. Guidelines for urodynamics and uro-neurophysiology**

1. Urodynamic investigation is necessary to document the (dys-)function of the LUT.
2. The recording of a bladder diary is highly advisable.
3. Free uroflowmetry and assessment of residual urine is mandatory before invasive urodynamics is planned.

4. Video urodynamics is the gold standard for invasive urodynamics in patients with NLUTD. Should this not be available, then a filling cystometry continuing into a pressure flow study should be performed.
5. A physiological filling rate and body-warm saline must be used.
6. DLPP is an important investigation in patients with endangered upper tracts.
7. Specific uro-neurophysiological tests are elective procedures.

## 2.1. Typical manifestations of NLUTD

Typical findings in NLUTD as listed in table 4 warrant further neurological evaluation, as LUTD may be the presenting symptom of NLUTD.

**Table 4. Typical manifestations of NLUTD**

Filling phase:

- Hyposensitivity or hypersensitivity
- Vegetative sensations
- Low compliance
- High capacity bladder
- Detrusor overactivity, spontaneous or provoked
- Sphincter acontractility.

Voiding phase:

- Detrusor acontractility
- DSD
- Non-relaxing urethra
- Non-relaxing bladder neck

## Treatment

The first aim of any therapy for NLUTD is protection of the upper urinary tract. Other important aims include improvement of urinary continence and patient's quality of life, and restoration of part or all of normal LUT function. The patient's disability, cost effectiveness, technical intricacy, and potential complications must also be considered.

### Non-invasive conservative treatment

#### 1 Assisted bladder emptying

Incomplete bladder emptying is a serious risk factor for UTI, for developing high intravesical pressure during the filling phase, and for incontinence. Therefore, methods to improve the voiding process are practised in patients with NLUTD.

#### 2 Lower urinary tract rehabilitation

In selected cases behavioural modification, Pelvic floor muscle exercises, pelvic floor electrostimulation and Biofeedback may be effective.

#### 3 Drug treatment

A medical therapy for NLUTD is not available. Most drugs used only resolve part of the problems, or are adjunct to other measures.

**Guidelines** for non-invasive conservative treatment are given in table 5.

#### **Table 5. Guidelines for non-invasive conservative treatment**

1. The first aim of any therapy is the protection of the upper urinary tract.
2. The mainstay of the treatment for overactive detrusor is anticholinergic drug therapy.

3. Rehabilitation and neuromodulation may be effective in selected cases.

4. A condom catheter or pads may reduce the incontinence to a socially acceptable situation.

Any method of assisted bladder emptying should be used with the greatest caution

## Minimal invasive treatment

### Catheterization

Intermittent self- or third party catheterization (IC) is the gold standard for the management of NLUTD in patients with detrusor underactivity or acontractility and in patients with adequate control of detrusor overactivity.

**Guidelines** for catheterization are given in table 6.

#### Table 6. Guidelines for catheterization.

1. Intermittent catheterization (IC) is the standard treatment for patients who are unable to empty the bladder.
2. Patients should be well instructed on the technique and risks of IC.
3. Aseptic IC is the method of choice.
4. The catheter size is 12-14 Fr.
5. The frequency of IC is 4-6 times per day.
6. The bladder volume must remain below 400 ml and the post-IC residual low.
7. Indwelling transurethral and suprapubic catheterization should be used only exceptionally, under close control and the catheter should be changed frequently. Silicone catheters are preferred and should be changed every 2-4 weeks, (coated) latex catheters need to be changed every 1-2 weeks.

### **Intravesical drug treatment**

For the reduction of the detrusor overactivity, anticholinergics can be applied also intravesically. Adverse effects are reduced by different sequestretation.

Botulinum toxin causes a long-lasting but reversible chemical denervation that lasts for about 9 months. The toxin injections are mapped over the detrusor in a dosage that depends on the preparation used. Generalized muscular weakness may be a seldom adverse effect.

### **Intravesical electrostimulation**

Intravesical electrostimulation enhances the sensation for bladder filling and urge to void and may restore the volitional control of the detrusor. Patients with peripheral lesions are the best candidates, the detrusor muscle must be intact, and some afferent connection between the detrusor and the brain must still exist .

### **Bladder neck and urethral procedures**

Reduction of the bladder outlet resistance is often necessary to protect the upper urinary tract. Resulting stress incontinence can be managed by external appliances.

The effectiveness of these procedures is listed in table 7 (with the exception of balloon dilatation: notwithstanding favourable initial results, no further information has become available since 1994).



**Guidelines** for minimal invasive treatment are given in table 7.

**Table 7. Guidelines for minimal invasive treatment.**

1. Guidelines for catheterization are listed separately in table 6.
2. Botulinum toxin injections in the detrusor are the most promising intravesical drug application for reduction of detrusor overactivity.
3. Intravesical electrostimulation may be of value in specific patients.
4. (Laser) sphincterotomy is the standard treatment for DSD or other increased bladder outlet resistance at the sphincteric area. Botulinum sphincter injections will be the first choice in patients ineligible for interventional surgery. Bladder neck incision is effective in a fibrotic bladder neck. Urethral stents still have too many complications.
5. Urethral bulking agents have disappointing long term effects.

## **Surgical treatment**

### **Urethral and bladder neck procedures**

Increasing the subvesical resistance causes increased intravesical pressure in particular during the voiding phase. These procedures thus are suitable only when the detrusor activity is controlled, when no significant reflux is present, when moreover the condition of the urethra and bladder neck is good, and also they mostly cause intermittent catheterization.

**Guidelines** for surgical treatment are given in table 8.

**Table 8. Guidelines for surgical treatment.**

*Detrusor*

*Overactive*

- Detrusor myectomy is an acceptable option for the treatment of overactive bladder when more conservative approaches have failed. It is limited invasive and has minimal morbidity.
- Sacral rhizotomy with SARS in complete lesions and sacral neuromodulation in incomplete lesions are effective treatments in selected patients.
- Bladder augmentation is an acceptable option to decrease detrusor pressure whenever less invasive procedures have failed. For the treatment of a severely thick or fibrotic bladder wall a bladder substitution might be considered.

*Underactive*

- SARS with rhizotomy and sacral neuromodulation are effective in selected patients.
- Restoration of a functional bladder by covering with striated muscle is still experimental.

*Urethra*

- Overactive (DSD) - refer to guidelines for minimal invasive treatment (Table 7)

*Underactive*

- The placement of a urethral sling is an established procedure.
- The artificial urinary sphincter is very effective.
- Transposition of the gracilis muscle is still experimental.

## Treatment of vesico-ureteral reflux (VUR)

The treatment options for VUR in patients with NLUTD are essentially similar as for other reflux patients. Subtrigonal injections with bulking agents or ureteral re-implantation are the standard procedures. In deciding which procedure will be offered to the patient, the relative risks of more invasive surgery and of less successful therapy should be considered.

## Quality of life

Life expectancy does not need to be impaired by NLUTD. With adequate treatment and neuro-urological care over a lifetime, quality of life can be assured.

## Follow up

NLUTD is an unstable condition and can vary considerably within a relatively short period. Meticulous follow-up and regular checks are necessary, with time between detailed investigations being no longer than 1-2 years.

**Guidelines** for follow up are given in table 9.

### Table 9. Guidelines for follow up.

1. Possible UTI checked by the patient (dip stick).
2. Urinalysis every second month.
3. Upper urinary tract, bladder morphology, and residual urine every six months (ultrasound)
4. Physical examination, blood chemistry, and urine laboratory every year.
5. Detailed specialistic investigation every 1-2 years and on demand when risk factors emerge. The investigation is specified according to the patient's actual risk profile, but should in any case include a video urodynamic investiga-

tion and should be performed in a leading neuro-urological center.

6. All of the above more frequent if the neurological pathology or the NLUTD status demand this.

## Conclusion

NLUTD is a multi-faceted pathology. It needs an extensive and specific diagnosis, before we can embark on an individualized therapy that takes into account the medical and physical condition of the patient, and the patient's expectations about his future social and physical situation with respect to the NLUTD.

The urologist or pediatric urologist can select from a wealth of therapeutical options, each of which with its specific pros and cons. Notwithstanding the success of any therapy embarked upon, patients are likely to require close surveillance for their entire life.

The appropriate therapy, as always, is governed by the golden rule: As effective as needed, as little invasive as possible.

*This short booklet is based on the more comprehensive EAU guidelines (ISBN 90-70244-06-3), available to all members of the European Association of Urology at their website - [www.uroweb.org](http://www.uroweb.org).*