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Development of a questionnaire dedicated to neurogenic lower urinary tract dysfunction and localization- a pilot study

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Abstract

Background & Objective: There is a significant knowledge gap and paucity of symptom questionnaires to assess neurogenic lower urinary tract dysfunction (NLUTD). This study aimed to localize the level, nature and severity of NLUTD using a self-made set of questions that can be used to evolve a NLUTD specific questionnaire. *Methods*: This cross-sectional, observational single centre pilot study included patients with non-obstructive NLUTD. Based on inputs from literature, experts and patients, a set of questions was generated, henceforth called the AIIMS-J NLUTD questionnaire (AIIMS-J NUDQ). The expected clinical type and level of bladder involvement was classified into frontal, suprapontine, suprasacral infrapontine and sacral or infra-sacral lesions. The answers on the AIIMS-J NUDQ were noted for each level of bladder involvement to delineate localization specific questions and evolve a diagnostic algorithm for neurogenic bladder. *Results*: The AIIMS-J NUDQ had two different sets of questions. The first set had responses in the form of yes and no while the second set focused on quantification of symptoms. In the pilot study of 72 patients, bladder involvement was localised to frontal level in 11.1%, suprapontine (34.7%), suprasacral (37.5%), sacral/infra-sacral (9.7%) and UMN bladder with shock (7.0%). Specific features were observed in the different bladder types. Ten discriminatory questions were defined to aid localization of NLUTD and a diagnostic algorithm formulated.
Conclusions: Analysis of bladder dysfunction in neurological disorders using the AIIMS-J NUDQ demonstrated it was able to espouse specific bladder related symptoms that could help in localization of NLUTD.

Keywords: Neurogenic lower urinary tract dysfunction, AIIMS-J NLUTD questionnaire, localization, severity, neurological disorders

INTRODUCTION

Patients with neurogenic lower urinary tract dysfunction (NLUTD), previously known as neurogenic bladder, often have various coinciding pathophysiological mechanisms leading to urinary symptoms.[1] The complexity of symptoms and types of bladder storage and voiding dysfunction depends on the level of neurological lesion.[1,2] In turn, the type of neurological lesion, its site, extent, and evolution determines the severity and nature of NLUTD.[2-4] Additionally, patients with NLUTD have associated complications as a consequence. Patients with detrusor-sphincter dyssynergia (DSD) may be vulnerable to autonomic dysfunction, recurrent urinary tract infections, urinary incontinence, vesico-ureteral reflux (VUR), and renal failure with increased morbidity.[5] Problems with appropriate toileting associated with functional urinary incontinence can arise even if bladder function and micturition mechanisms are normal. Furthermore, conditions like dementia make it

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difficult for patients to identify the sensation of bladder fullness, appropriateness to void, and hold up of voiding until socially correct, making them incontinent despite a normal lower urinary tract.[6]

Localization of neurological disorders is traditionally based on an astute historical and neurological examination. Bladder symptoms are usually underreported unless specifically asked and are managed on the sidelines of the core neurological illness. As such no specific emphasis is noted on NLUTD localization when bladder symptoms accompany neurological disorders. In addition, a patient may present solely with bladder symptoms, either as an isolated manifestation or an initial presentation of a neurological disorder such as normal pressure hydrocephalus or myelin oligodendrocyte glycoprotein antibody associated disease. The complexities of NLUTD may appear daunting enough and unless a goal directed approach for maximizing diagnostic outcome is evolved, it might culminate into searching for a needle in the haystack. In resource limited settings as we experience in India and other Asian nations, a structured and targeted approach to NLUTD will reduce investigative burden on the patients compared to more extensive evaluations.

A review of literature reflects the lack of NLUTD specific questionnaires based on the hypothesis that the conglomerate of symptoms and consequences would aid in assessing the different levels and nature of involvement in the neuraxis for the same. Most questionnaires for NLUTD such as Qualiveen and Spinal cord injury- quality of life (SCI-QOL) Bladder Management Complications tool, are either related to quality of life (QOL) or severity and consequences of bladder involvement.[7,8] Also most such questionnaires focus on patients of spinal cord injury (SCI) or other pathological substrates in the spinal cord. Another urinary specific QOL instrument, I-QOL (Incontinence QOL) scale for SCI mainly emphasizes the patients' feelings rather than bladder symptoms.[9] Even the Neurogenic Bladder Symptom Score (NBSS), a patient-reported outcome measurement tool to discriminate among patients with different levels of bladder symptoms, included only SCI, multiple sclerosis and spina bifida. Thus, NBSS is not widely studied in all subsets of neurological disorders, and was especially found inadequate in the Indian sociocultural context in some patients.[10,11]

Understandably a comprehensive assessment of NLUTD with evaluation of therapeutic response and adequacy of goal oriented treatments would be ideal. As such, a complete urodynamic study (UDS) is the gold standard for guiding clinical decision-making and understanding the complexity of NLUTD and voiding dysfunction.[12] However, while non-invasive UDS (post-void residual and uroflowmetry) is inexpensive, easily available, has low morbidity but with limitations in assessing pelvic floor dysfunction, malfunctioning detrusor and outlet issues, the invasive UDS is a more sensitive and specific tool for NLUTD. However, performance of these invasive investigations have limitations, including patient cooperation, tract infection, inability to perform the task, labour intensive tests and the relative lack of availability of invasive UDS.

This emphasizes the need for a symptom checklist developed specifically for patients with suspected NLUTD. Such a symptom and localization specific questionnaire would aid in rapid assessment of patients and help direct specific management and treatment plan. Thus, this study attempts to explore the clinical symptoms and presentation profile of patients with neurological disorders to delineate the questions that will aid in developing a symptom-based questionnaire for the type, site and severity of NLUTD.

METHODS

This cross-sectional single centre pilot study was conducted at a tertiary care hospital in western India after due ethical clearance by the Institutional Ethics Committee (AIIMS/IEC/2021/3683). Patients were enrolled after informed written consent. The inclusion and exclusion criteria were as follows-

Inclusion criteria: Patients should be aged 18 or more; Patients should bladder dysfunction alongside the neurological disorder he/she is suffering from; Patients capable of giving relevant history of bladder dysfunction and undergo respective tests; Patients providing written informed consent.

Exclusion criteria: Patients in altered sensorium requiring catheterization and/or in ICU setting; Patients who are unable to comprehend; Patients suffering from primary urinary tract infection or urological issues; Patients who have undergone prior urologic surgery.

Demographic details and clinical history and neurological examination was noted. The provisional nature of neurological disorder and

clinical level of involvement in the neuraxis was made. Radiological imaging like CT / MRI of brain /spine was done as indicated to additionally corroborate the diagnosis and clinical level. Urine microscopy and urine culture sensitivity was done in all patients to rule out for urinary tract infection. Once NLUTD was suspected, a detailed history of bladder related symptoms were recorded.

Based on review of literature of various questionnaires related to NLUTD, we initially delineated a pool of possible questions of appropriate length with closed end questions addressing this issue.[2-9] These items were categorized into various domains so that the checklist could be used in a meaningful way and all related questions/items are covered together so as not to hamper the flow of clinical interview. Hence, we developed a preliminary multi-dimensional, rater administered questionnaire. It was then reviewed and revised by the expert committee including neurologist (SP, NA), neurosurgeon (SB), urologist (DPB), and radiologist (ST). Double-barrelled questions, negative questions and overtly long questions were edited including questions which were deemed inappropriate. Various terminologies used to describe bladder symptoms were applied from the International Continence Society (ICS) standards.[13]

This preliminary checklist of questions was pretested on 20 patients to further refine their applicability and understanding, and to assess the flow of the questionnaire. In addition, the patients were also provided with open questions for any item they would prefer in such a checklist in general or against any of the domains identified. These identified questions were also incorporated into the questionnaire. Following this, the authors questionnaire was again reviewed by experts and finalized. This questionnaire which will henceforth be called the AIIMS-J NLUTD questionnaire (AIIMS-J NUDQ) was administered to the subsequent patients fulfilling the inclusion criteria for suspected NLUTD in the pilot study. The questionnaire was explained to the patients in their regional language and was filled by the patients with the assistance of the researcher.

The level of bladder involvement was classified into frontal, suprapontine, suprasacral infrapontine and sacral or infra-sacral lesions based on clinical features and existing literature considering the neurological disorder.[2-4] Using the AIIMS-J NUDQ, the symptoms of NLUTD were grouped into symptom categories or domains and bladder dysfunction was analysed based on the previously defined level of NLUTD. The questions in the AIIMS-J NUDQ that had highest frequency of a positive answer for each level of bladder involvement was noted. This helped in delineating the set of localization specific questions for NLUTD using AIIMS-J NUDQ as well as evolving a diagnostic algorithm with relevant questions for each level of bladder involvement.

Statistical analysis

Collected data was analysed using SPSS 22.00 for windows; SPSS inc, Chicago, USA software. Continuous variables were described by means and standard deviations (SD) along with 95% confidence intervals of the means were calculated. For each assessment point, data was statistically analysed using one-way Anova test. Difference between two groups was determined using t test as well as chi square test and the level of significance was set at $p < 0.05$.

RESULTS

The AIIMS-J NUDQ was applied to 72 patients (mean age: 48.8 ± 17.46 years; 70.8% male). The different neurological disorders noted were extra-medullary spinal cord lesions (31.9%)- prolapsed intervertebral disc (9.7%), traumatic (8.3%), cauda conus disorder (5.6%); demyelinating disorders (22.2%) including neuromyelitis optica (11.1%), multiple sclerosis (5.6%); parkinsonian disorders (16.7%), cortical dementia (12.5%), vascular dementia (9.7%) and others (15.3%). The most common clinical level of lesion was at cortical/subcortical site (27.8%) followed by lower cervical cord (C5-C8) (16.7%) (Figure 1).

Patients were classified into different levels of NLUTD i.e., frontal, suprapontine, suprasacral infrapontine, sacral/ infrasacral/ peripheral arc and upper motor neuron (UMN) bladder with shock (Figure 2). Suprasacral infrapontine bladder type (37.5%) was most common followed by suprapontine bladder (34.7%). All patients with frontal bladder type and most with suprapontine bladder (21/25) had imaging characteristics of cortical/subcortical involvement. Similarly, of 27 patients of suprasacral infrapontine type of bladder involvement, 21 had spinal cord lesions (cervical to thoracolumbar). Likewise, amongst 7 patients of lower motor neuron (LMN) bladder (sacral/infrasacral), 6 had radiological lesions along cauda equina/lumbosacral roots. Thus,

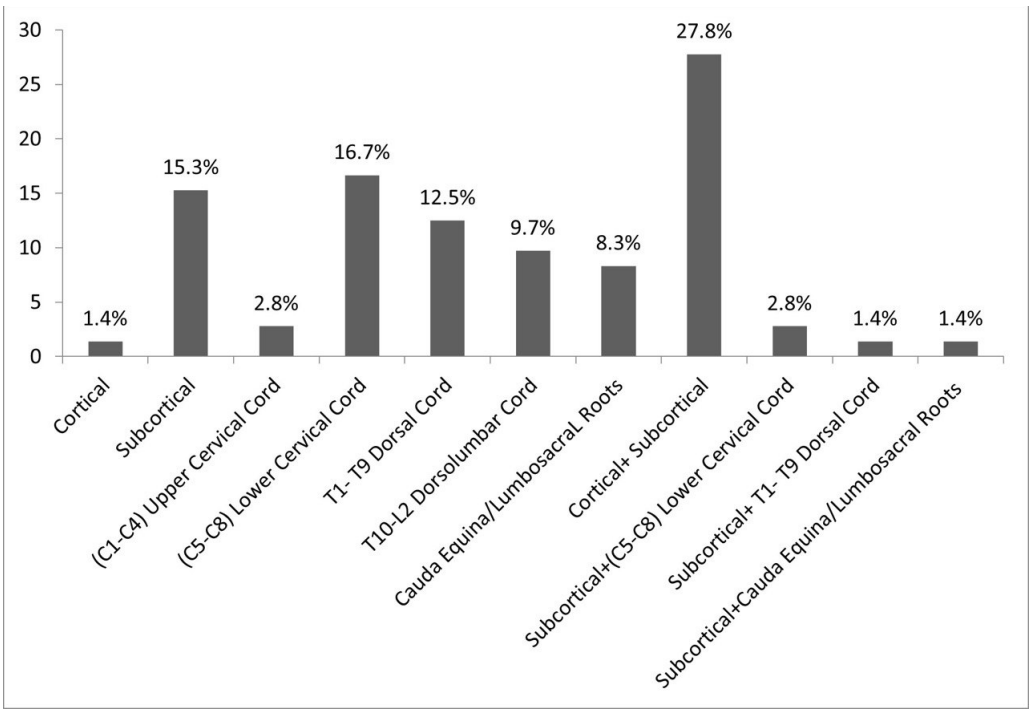

Figure 1. Clinical level of neurological localization in the subjects.

neuro-radiological concordance was noted with commonest sites of radiological lesion being cortical/subcortical (26.4%) followed by cervical cord (18.1%).

The AIIMS-J NUDQ had two different sets of questions. The first set had responses as 'yes' and 'no' (Table 1 supplementary). The second set focused on quantification of symptoms (Supplementary Table 2).

Presenting symptoms of NLUTD dysfunction were grouped into symptom categories namely urinary urgency, frequency, urge incontinence, hesitancy, loss of insight and others (Figure 3). The domains of storage, voiding, incontinence, functional incontinence, and decreased/absent bladder sensation hence delineated, were reported among 77.8%, 37.5%, 76.4%, 11.1% and 15.3%, respectively.

On analysing the symptom categories in different types of NLUTD, nocturia was seen in all patients of frontal and suprasacral infrapontine and most patients of suprapontine bladder types, in whom patients had to wake up for urination more than twice during the night (Q.2b). This

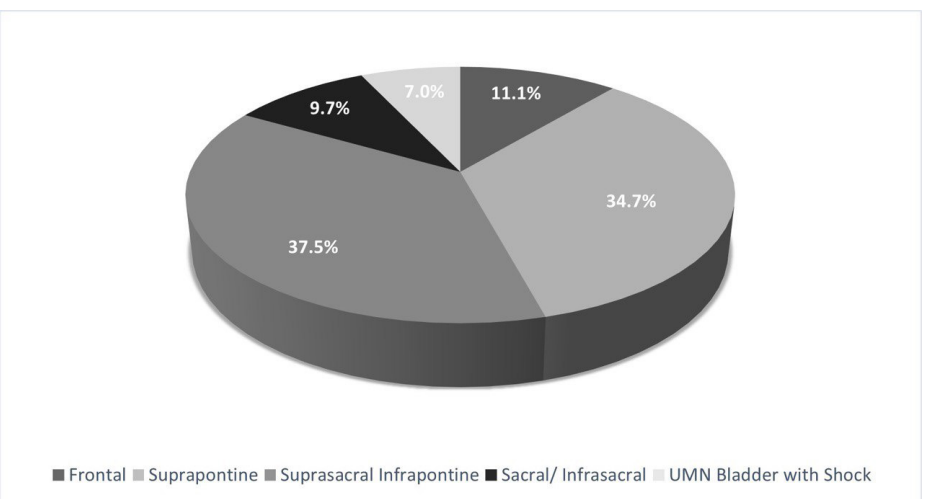

Figure 2. Distribution of bladder dysfunction as per clinical level of involvement.

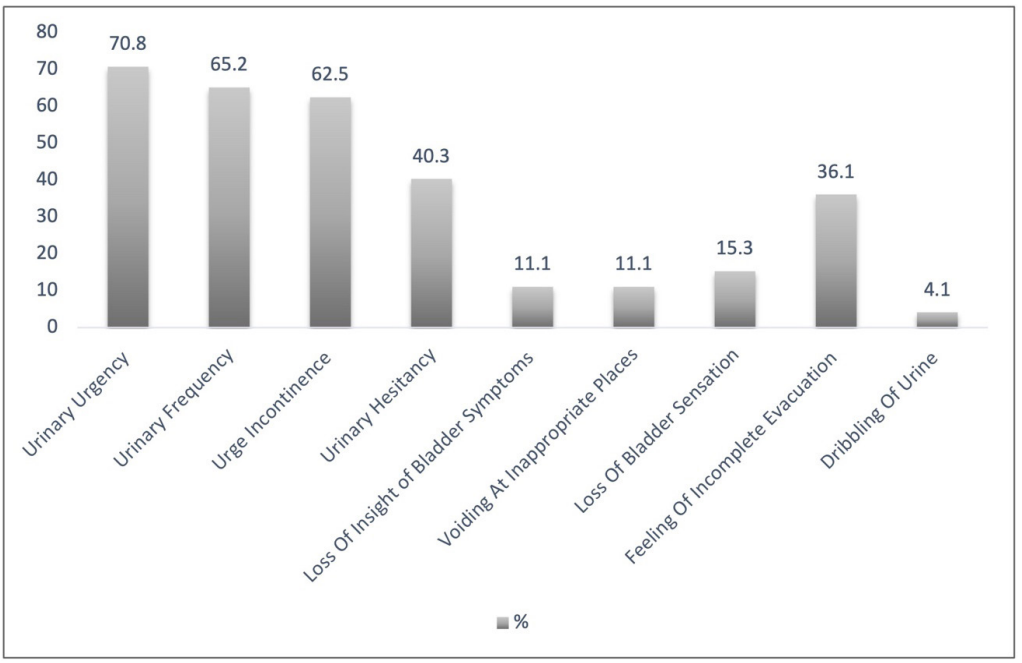

Figure 3. Distribution of symptom categories of NLUTD in the subjects.

was rarely seen in the remaining bladder types (Table 1 and 2). Most patients of suprapontine and some of suprasacral infrapontine bladder types had increased urinary frequency of up to 8-10 times a day, unlike none in UMN bladder with shock and only a few of sacral/infrasacral bladder type (Q.1) (Table 2). All patients with frontal bladder type had loss of insight of bladder symptoms and urinated in public places without any guilt (Q.3 and Q.4). Most patients with suprapontine and suprasacral infrapontine bladder type experienced urgency along with urge incontinence with a frequency of more than once a day unlike remaining bladder types (Q.5 and Q.6). The feeling of incomplete evacuation and hesitancy was seen mostly in patients of suprasacral infrapontine bladder type, rarely in suprapontine and none in remaining bladder types (Q.7, Q.9 and Q.10). The strength of urinary stream though variable across different bladder types, was good in frontal bladder, moderately good in suprapontine, moderate in suprasacral infrapontine and moderately-poor in sacral/infrasacral and UMN bladder with shock bladder types (Q.8 and Q.14). Dribbling and stress incontinence was seen very rarely and involved only suprapontine and suprasacral infrapontine bladder types (Q.12b and Q.16). The amount of urine passed each time was scant in suprasacral infrapontine and very large in sacral/infrasacral bladder type (Q.8). Bladder leaks with insight were predominantly in suprapontine and suprasacral infrapontine type of bladder (Q.6b). All patients with sacral/infrasacral and UMN bladder with shock bladder had reduced or absent bladder sensation and perianal loss of sensation while it was seen in none of suprapontine and frontal type of bladder (Q.21) (Table 1). Painful and burning micturition, and flank pain was seen very rarely and only in suprasacral infrapontine and suprapontine bladder types (Q.18,19 and Q.20).

Amongst the other associated symptoms, sexual dysfunction (only reported in males), constipation and faecal incontinence was noted (Table 2). Most male patients of sacral/infrasacral and UMN bladder with shock complained of erectile dysfunction and difficulty in ejaculation during sexual intercourse while it was only seen in some patients of suprasacral infrapontine, rarely in suprapontine and none in frontal bladder type (Q.22 and Q.23). Of these patients, 37.5% had thoraco-lumbar involvement, 25% cervical cord lesion and 16.7% had cauda equina/ lumbosacral root involvement. All patients of sacral/infrasacral, most with suprasacral infrapontine and UMN bladder with shock as well as half of suprapontine bladder types had constipation (Q.26). Faecal incontinence was seen rarely in UMN bladder with shock and suprasacral infrapontine bladder types (Q.27).

The QOL was defined in Q.29 of the

Table 1: Distribution of responses to Yes-No questions (yes) in AIIMS-J NUDQ with respect to type of NLUTD

Question	Urological Level				
	Frontal N=8	**Suprapontine N=25**	**Suprasacral Infrapontine N=27**	**Sacral/ Infrasacral N=7**	**UMN Bladder with Shock N=5**
Q 2a. Do you experience any awakening in night to urinate?	8	23	27	1	0
Q 3. Does the patient have insight of his/ her bladder symptoms?	0	25	27	7	5
Q 4. Do you or does your patient urinate often in public places without sense of the time or place?	8	0	0	0	0
Q 5a. Do you have the sudden strong urge to urinate before urine leaks?	0	25	26	0	0
Q 6a. Do you often leak urine on your way to washroom?	0	21	22	0	0
Q 7. Do you feel often that you haven't completely urinated?	0	1	25	0	0
Q 9. Do you feel the need to put strain when you have to urinate?	0	0	8	0	0
Q 10. Do you experience any hesitancy in starting urination?	0	2	26	0	0
Q 11. Do you feel that you aren't able to urinate even when you want to?	0	3	23	2	0
Q 12a. Do you experience any dribbling of urine?	0	1	2	0	0
Q 13. Do you get the sense of complete voiding each time you urinate?	8	25	0	0	0
Q 15. Do you get the feeling that your bladder is full?	8	25	27	0	0
Q 16. Is there any leakage of urine while you cough or sneeze or lift heavy weight?	0	1	2	0	0
Q 17. Do experience any pain while you urinate or are about to urinate?	0	1	1	0	0
Q 18. Do you feel any burning sensation while you urinate?	0	2	4	1	0
Q 19. Do you experience any colicky pain in your flanks/ loin?	0	1	1	0	0
Q 20. Do you ever have blood in urine?	0	0	0	0	0
Q 21. Have you ever noticed decreased/ loss of sensations over buttocks or peri anal region?	0	0	11	5	4

(Table 1: continued)

Question	Urological Level				
	Frontal N=8	**Suprapontine N=25**	**Suprasacral Infrapontine N=27**	**Sacral/ Infrasacral N=7**	**UMN Bladder with Shock N=5**
Q 22. Do you ever experience erectile dysfunction? (51 male patients)	0	4	11	5	4
Q 23. Do you ever experience difficulty in ejaculation during sexual intercourse? (51 male patients)	0	1	3	2	1
Q 24. Do you have pain during sexual intercourse?	0	0	0	0	0
Q 25. Do you ever feel lack of sexual desire/arousal?	0	0	0	0	0
Q 26. Do you feel constipated frequently?	0	13	23	7	3
Q 27. Do you ever leak from your bowels when you don't need to?	0	0	1	0	2
Q 28. Does any of these urinary symptoms affect your daily activities?	4	24	27	7	5
Q 31. Do you have to keep a watch at your daily water intake due to your urinary symptoms?	0	22	26	4	1
Q 32. Do you not feel free to leave home for longer duration because of your urinary symptoms?	0	25	27	6	5

questionnaire. The mean value according to the patient's responses was 7.74±1.09 (Table 3). Statistically significant negative correlation of QOL was seen in UMN bladder with shock and sacral/infrasacral bladder types while patients with frontal bladder type had better QOL (p value: 0.032). Most patients of all bladder types had symptom free period of 2-3 hours in a day (Q.30). Most patients of suprasacral infrapontine, and suprapontine bladder types had to keep a watch on their daily intake and decrease their water intake to avoid the bladder related symptoms (Q.31). All patients of UMN bladder with shock and most of suprapontine, suprasacral infrapontine, and sacral/infrasacral bladder types, did not feel free to leave their home for longer duration because of their urinary symptoms (Q.32) (Table 1).

Thus based on above observations, the questions with highest response rate for each bladder type were delineated as qualifier questions (Table 4). These questions were then used to evolve a diagnostic algorithm from the AIIMS-J NUDQ to aid localization of the type of NLUTD on a symptom based approach (Figure 4).

DISCUSSION

This pilot study is an attempt to evolve a clinical based diagnostic algorithm for NLUTD to serve as a tool in the initial assessment. Using the AIIMS-J NUDQ, the authors were able to demonstrate that a dedicated set of questions could help define the symptoms and mechanistic type of bladder dysfunction and further help categorize into different types of NLUTD. The neuraxial level of localization of most neurological disorders is usually done based on clinical history and evaluation. When bladder symptoms co-occur with neurological symptoms, the type and

Table 2: Distribution of responses to multiple-choice questions in AIIMS-J NUDQ with respect to type of NLUTD

Questions	Frontal N=8	Suprapontine N=25	Suprasacral Infrapontine N=27	Sacral/ Infrasacral N=7	UMN Bladder with Shock N=5
Q1. Frequency of going to washroom					
1-7 times	6	2	6	0	0
8-10 times	2	20	14	1	0
11-13 times	0	2	4	0	0
>13 times	0	1	3	0	0
Q2b. How many times do you have to wake up?					
Once	0	0	1	0	0
Twice	4	3	3	0	0
>Twice	4	20	23	1	0
Q5b. How often do you get this urge to urinate?					
Occasionally	0	3	1	0	0
Sometimes	0	9	5	0	0
Most of the times	0	11	16	0	0
All the time	0	2	4	0	0
Q6b. How frequently do you leak urine on way to washroom?					
Rarely	0	1	1	0	0
Few times a week	0	4	2	0	0
Once a day	0	2	1	0	0
More than once a day	0	14	18	0	0
Q8. How much amount of urine do you pass each time you go to washroom?					
Scanty	0	2	21	0	2
Normal	8	22	8	0	1
Very large	0	1	0	7	2
Q12b. How often do you experience dribbling of urine?					
Occasionally	0	0	1	0	0
Sometimes	0	1	0	0	0
Most of the times	0	0	1	0	0
All the time	0	0	0	0	0
Q14. How is the strength of stream of urine when you urinate					
Good	7	13	6	0	0
Moderate	1	10	15	3	4
Poor	0	2	6	4	1
Q30. Symptom free period in a day					
<1hr	0	1	2	6	2
1-2 hr	0	6	10	1	0
2-3 hr	3	15	13	0	2
>3 hr	5	3	2	0	1
Q33. What precautions do you take					
None	8	1	3	0	0
Decreased water intake	0	22	19	0	0
Catheterized	0	0	4	7	5
Diapers use	0	2	1	0	0

Table 3: Quality of life according to AIIMS-J NUDQ with respect to urological localization

Urological Level	Mean±SD
Frontal	5.375±3.08
Suprapontine	7.28± 0.89
Suprasacral infrapontine	7.74±0.94
Sacral/Infrasacral/Peripheral Arc	8.42±0.46
UMN bladder with shock (Suprasacral infrapontine sacral/ Infrasacral)	8.80±0.36

localization of NLUTD is more easily deduced. However, when bladder related symptoms occur alone or pre-date other neurological symptoms or there are multiple levels of involvement and complications thereof, a clear delineation of bladder type maybe challenging. This is specially so as most clinical interviews do not lay enough stress to symptoms related to bladder, bowel and sexual function. As a corollary, patients and caregivers also underrate the importance of these symptoms, are hesitant and feel socially awkward, resulting in poor health seeking behaviours in this regard.

Based on anatomical location of underlying neurological disorder, Panicker et al classified NLUTD into suprapontine lesion (predominantly storage symptoms), suprasacral infrapontine lesions (predominantly storage and voiding symptoms) and sacral or infrasacral lesions (predominantly voiding symptoms).[4] In the beginning of our study, we hypothesized that symptoms of NLUTD can be classified into frontal, suprapontine, suprasacral infrapontine and sacral/infrasacral and UMN bladder with

Table 4: Qualifier questions from AIIMS-J NUDQ for the different types of NLUTD

Q. No	Questions in AIIMS-J NUDQ	Frontal	Suprapontine	Suprasacral	Sacral/ infrasacral	UMN bladder with shock
3	Insight of bladder symptoms	No	Yes	Yes	Yes	Yes
4	Urination in public places without sense of time/place	Yes	No	No	No	No
5a	Do you have sudden urge to urinate before urine leaks	No	Yes	Yes	No	No
6a	Do you leak urine on the way to washroom	No	Yes (no)	Yes (no)	No	No
7	Feeling of incomplete evacuation	No	No	Yes	No	No
8	Amount of urine each time you go to washroom	Normal	Normal	Scanty/ normal	Scanty/ normal/ large	Large/ normal
10	Do you experience any hesitancy in starting urination	No	No	Yes	No	No
11	Feeling of not able to urinate even when you want to	No	No	Yes	No	No
14	How is the strength of stream of urine when you urinate	Good	Moderate/ good	Poor/ moderate	Poor/ moderate	Poor/ moderate
15	Do you get the feeling that your bladder is full	Yes	Yes	Yes	No	No

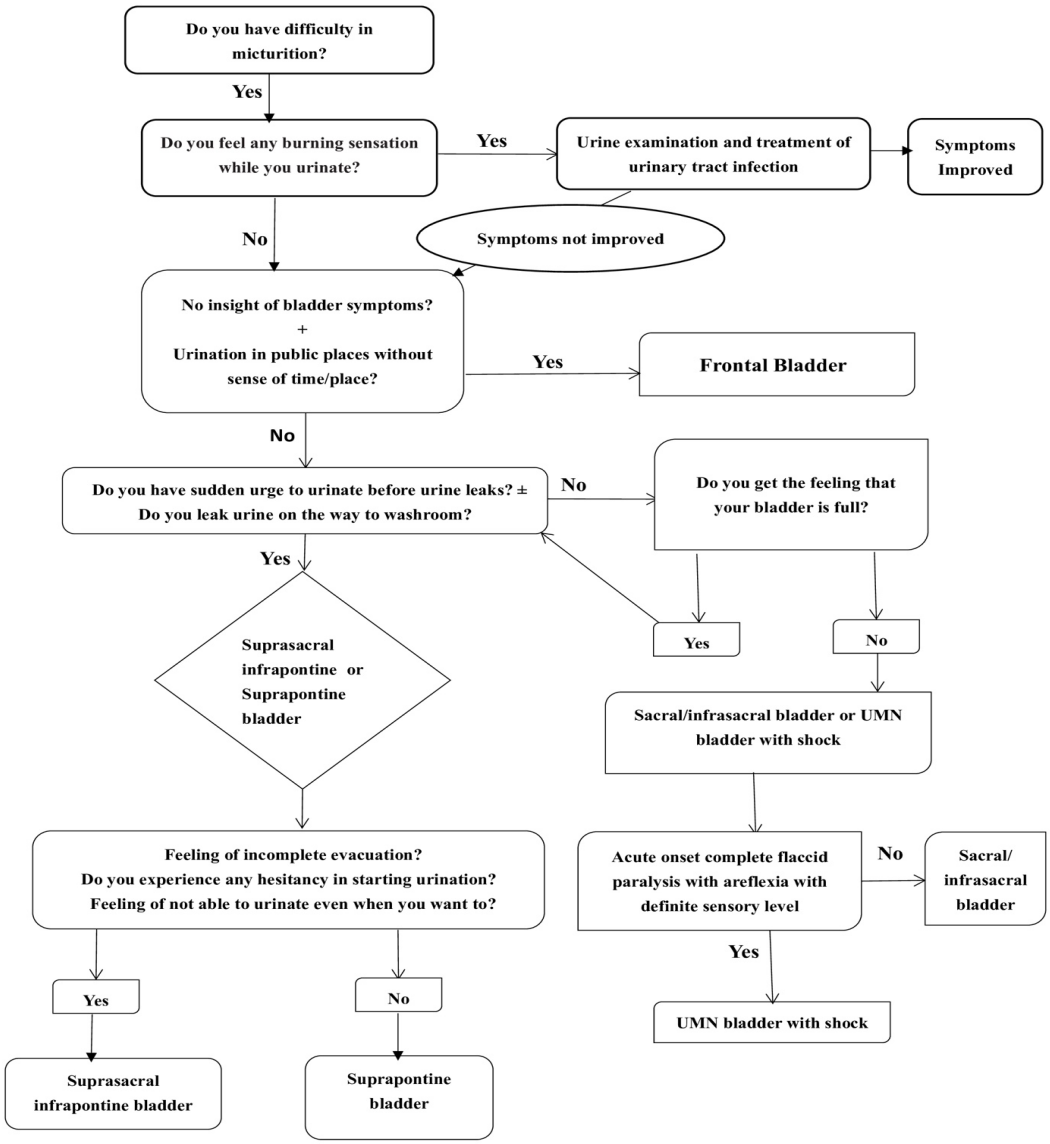

Figure 4. Algorithm generated from the results of pilot study using AIIMS-J NUDQ for localization of type of NLUTD

shock bladder types based on specific clinical questions. Thus, this questionnaire was attempted using the most relevant bladder symptom related questions with relevance to bladder type.

As described, certain questions in the AIIMS-J NUDQ had a higher frequency in specific bladder types (Table 4). While the AIIMS-J NUDQ was able to evolve a clear picture of the localization of bladder type, it could not fairly differentiate UMN bladder with shock and LMN type bladder (sacral and infra sacral) which manifests as areflexic bladder lasting for 6-12 weeks and up to one year. However, addition of clinical history and examination such as tempo of onset, presence of complete flaccid paralysis, areflexia and definite sensory level made the differentiation less challenging.

The prevalence of NLUTD has been studied in different neurological disorders [multiple sclerosis (MS), acute transverse myelitis, Parkinson disease (PD), neuromyelitis optica spectrum disorders, SCI and several others].[14-20] A systematic review for LUTS in common neurological disorders by Moussa et al suggested that patients of MS rarely have urological symptoms as their first presentation (3-10%).[14] Majority developed urinary symptoms later in the course with urinary urgency, frequency

and nocturia occurring most commonly while incontinence and poor emptying were noted infrequently. In another systematic review on epidemiology of urinary incontinence and detrusor overactivity in patients of NLUTD, Ruffion et al found that the prevalence of urinary incontinence was 50.9% in MS, 52.3% with SCI, 33.1% with PD and 23.6% with stroke.[15] Likewise, detrusor overactivity was observed in 58.2% (50.5–65.9) with MS, 49.7% (37.3–62.2) with SCI, 58.6% (34.3–83.0) with PD and 64.7% (54.2–75.3) with stroke.

In 2008, Homma *et al.* attempted to identify symptoms of higher relevance in patients complaining of LUTS to develop a core lower urinary tract symptom score (CLSS) questionnaire.[20] The questionnaire covering LUTS was administered to 1000 subjects with LUTS and 360 controls. Symptoms were defined as 'highly relevant (core LUTS)' when indicated by at least 25% of symptomatic patients. Ten symptoms (daytime frequency, nocturia, urgency, urgency incontinence, stress incontinence, slow urinary stream, straining, feeling of incomplete emptying, bladder pain, and urethral pain) were selected as highly relevant. The CLSS questionnaire was confirmed as showing test-retest reliability and useful for new patients, those with multiple diseases, and without definite diagnosis, as well as before and after interventions that may cause other symptoms. Apart from this, most other scores have dealt with assessment of effect of NLUTD on QOL.

However, till date, no questionnaire has been developed for categorization into localization of NLUTD and the AIIMS-J NUDQ is a step towards it. The clinimetric properties of such a questionnaire developed and tested in this small pilot sample needs to be assessed and validated in larger patient groups for use in the clinical setting along with evaluation of its utility in quantifying response to treatment of NLUTD. While this may be considered an initial step in evaluation of NLUTD, a subsequent multidisciplinary approach including UDS is needed for the proper management of NLUTD.[21]

In conclusion, analysis of bladder dysfunction in neurological disorders using the AIIMS-J NUDQ demonstrated preliminary data for a questionnaire based approach to localization of NLUTD. Information gleaned from this in addition to detailed urological and urodynamic evaluation may help a holistic localization and characterization of bladder symptoms.

DISCLOSURE

Data availability: Data will be made available after prior permission from the authors.

Financial support: None

Conflicts of interests: None

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