

## Short Communication

# Prevalence of urodynamic changes with risk for upper urinary tract damage in neuroschistosomiasis patients

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### Abstract

**Introduction:** This study aimed to identify the prevalence of urodynamic changes with an associated risk of developing upper urinary tract damage in neuroschistosomiasis patients. **Methods:** A prospective study was conducted, wherein 68 patients were admitted for analysis of urodynamics, urea and creatinine levels, and uroculture. **Results:** Blood test results did not indicate kidney failure. There were cases of asymptomatic bacteriuria. Common symptoms were frequent nocturia and detrusor overactivity. Results of low compliance and low cystometric capacity were both statistically significant ( $p = 0.001$  and  $p = 0.002$ , respectively). **Conclusions:** A high prevalence of negative urodynamic changes were found in neuroschistosomiasis patients.

**Keywords:** Neuroschistosomiasis. Schistosomiasis. Urodynamics.

Neuroschistosomiasis (NS) is a serious ectopic complication of schistosomiasis caused by *Schistosoma mansoni* whose most common presentation is schistosomal myeloradiculopathy (SMR)<sup>1-3</sup>. Clinically, NS is associated with meningeal myeloradicular compromise, paraparesis, flaccid paraplegia with loss of reflexes and sensation in the lower half of the body, paresthesia in sacral regions 1 and 5, and bladder and rectal sphincter abnormalities, causing urinary and intestinal dysfunction, as well as sexual impotence in men<sup>4-6</sup>.

The most common urological symptoms of SMR are urinary retention and incontinence, which are potential causes of chronic bladder dysfunction. Further complications include urinary tract infection, hydronephrosis, formation of upper tract stones, and renal failure<sup>7</sup>.

Urodynamic study is the most important complementary exam used in clinical practice for investigating the causes of voiding dysfunction. Urodynamic study is the propaedeutic

method for diagnosing lower urinary tract dysfunction, assessing bladder filling and emptying activity, and identifying the risk for upper urinary tract damage<sup>8</sup>.

This study aimed to identify the prevalence of urodynamic changes associated with risk for upper urinary tract damage in neuroschistosomiasis patients.

A prospective study was carried out at the Urology Outpatient Clinic between March 2014 and November 2015. The population was comprised of 68 patients, including 31 (46%) women and 37 (54%) men with voiding dysfunction and previous diagnosis of neuroschistosomiasis.

The prior diagnosis of neuroschistosomiasis was based on clinical presentation, neurological examination, testing for *S. mansoni* eggs in feces or by rectal biopsy, CSF exam, immunofluorescence for schistosomiasis, and spinal MRI. All patients reported a history of exposure to *S. mansoni* and had the chronic form of the disease.

Neuroschistosomiasis patients of both sexes experiencing voiding dysfunction were included in the study. Volunteers with a history of diabetes, chronic renal failure, resistant arterial hypertension, anatomic bladder obstruction, prior surgery of the bladder and pelvis, men with a prostate weighing  $\geq 40$ g on

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ultrasound, urinary tract infection, and a history of neurological diseases unrelated to schistosomiasis were excluded.

All patients had the chronic form of the disease with neurological and urological symptoms. Previously they underwent urological assessment, including anamnesis, and physical examination. The following examinations were also performed: urine type I, urine culture, serum urea and creatinine levels, urodynamic study, and ultrasound of the upper and lower urinary tracts and prostate (in males).

Urodynamics define the diagnosis of lower urinary tract dysfunction. The important criteria in this evaluation are measurements of pressure and flow at the leakage point. This analysis was performed using a Dynamed® UroMaster II device and the following variables were analyzed: detrusor overactivity, bladder compliance, bladder areflexia, and bladder capacity and sensitivity.

Statistical analyses were performed using descriptive analysis and the z-test was performed for comparing proportionality between the two groups of patients. The two groups were subsequently subdivided based on risk for upper urinary tract damage. A p-value <0.05 was considered statistically significant, and all calculations were performed using Excel for Windows software.

The project was approved by the Research Ethics Committee of the Center. All volunteers previously signed the free and informed consent form.

Patient ages ranged from 21 to 71 years, and the mean age was  $44.5 \pm 13.0$  and  $50.6 \pm 12.6$  years in the groups with and without risk for upper urinary tract damage (UUTD), respectively. Statistical comparison of the groups (Student's *t*-test) indicated that age had no effect on risk for UUTD ( $p = 0.880$ ).

In relation to kidney function, the mean levels of urea and creatinine were: 36.3 mg/dl and 0.82 mg/dl for groups with and without risk of UUTD, respectively (**Figure 1**). The uroculture was positive for *E. Coli* in 16 patients (24%), but they had no symptoms of urinary infections and were submitted to the urodynamic study while taking prophylactic antibiotics. The abnormalities found in the urodynamic tests are shown in **Table 1**. Among the variables studied, detrusor overactivity was the most frequent urodynamic symptom found (69.1%).

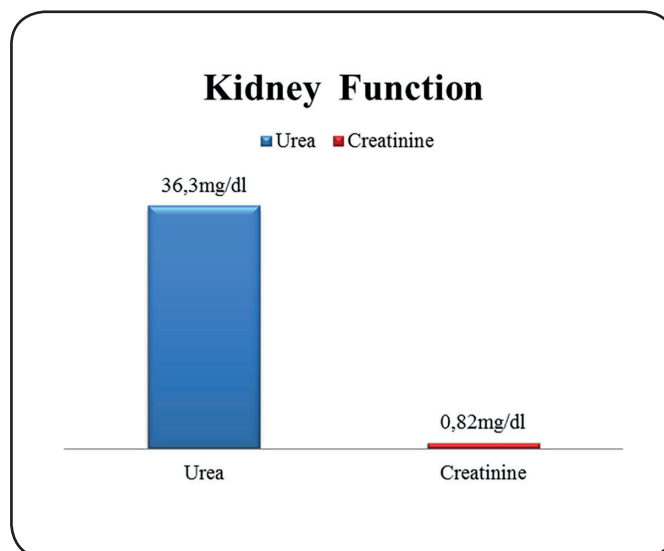
The mean volume of residual urine after voiding was 249.0ml (range 0-1.560ml). Forty patients had one or more urodynamic change associated with risk for UUTD. Patients were subdivided into two groups based on risk for UUTD. (**Table 2**), Associations between the risk for UUTD and low compliance ( $p = 0.001$ ) or low cystometric capacity ( $p = 0.002$ ) were detected. Analysis of the other changes like different kinds of symptoms and detrusor activity were not had relationship with the risk for UUTD.

Upper urinary tract damage is the leading urological complication in patients with NS. Consequently, the main objective of urological treatment in these patients is protecting the upper urinary tract and promoting normal storage and voiding<sup>9-11</sup>.

Urinary incontinence and other storage symptoms were the main complaints identified in the present study. Similar

**TABLE 1:** Urodynamic findings.

Variable	N	%
<b>• Bladder capacity (ml)</b>		
Increased (> 600)	13	19.1
Normal (300-600)	25	36.8
Low (< 300)	30	44.1
<b>• Compliance (ml/cmH20)</b>		
Increased (>80)	04	5.8
Normal (20-80)	32	47.1
Low (<20)	32	47.1
<b>• Sensitivity (ml)</b>		
Low (>300)	15	22.0
Normal (100-300)	13	19.1
Increased (<100)	32	47.1
Absent (0)	08	11.8
<b>• Cystometry</b>		
Detrusor overactivity	47	69.1
- No urine loss	17	36.2
- Urine loss	30	63.8
Stable detrusora	21	30.9
<b>• Pressure-flow study</b>		
Areflexia	19	27.9
Normal	10	14.7
Detrusor sphincter dyssynergia	31	45.6
Detrusor hypocontractility	08	11.7
<b>• Post-void residual urine (ml)</b>		
<100	32	47.1
>100	36	52.9



**FIGURE 1:** The graph shows the urea and creatinine levels calculated to assess the function of kidneys.

complaints were described by Guinetet al.<sup>8</sup>, although other studies have reported a higher incidence of voiding symptoms.

Detrusor overactivity was the most common urodynamic symptom found in the present study, affecting 47 patients. In this group, 31 (77.5%) had detrusor-sphincter dyssynergia, where in

**TABLE 2:** Urodynamic changes in patients with and without risk for upper urinary tract damage.

Urodynamic Changes	Risk for UUTD		p-value
	Present N= 40	Absent N= 28	
Storage symptoms	22 (55.0)	14 (50.0)	0.6841
Voiding symptoms	16 (40.0)	13 (46.6)	0.5981
Mixed symptoms	2 (5.0)	1(3.6)	1.0001
Low compliance	29 (72.5)	3 (10.7)	0.0011
Low cystometric capacity	24 (60.0)	6 (21.4)	0.0021
Detrusor areflexia	9 (22.5)	10 (37.7)	0.1171
Detrusor overactivity	31 (77.5)	16 (57.1)	0.0741

<sup>1</sup> Chi-squared Test <sup>2</sup> Fisher's Exact Test.

12 (38.7%) cases exhibited high detrusor overactivity without urine loss and 19 (61.3%) cases exhibited detrusor overactivity with low urine loss and consequent high post-void residual urine. These findings are consistent with the physiopathology of SMR, mainly because the upper spinal cord segments are spared, suggesting greater sacral involvement<sup>4-7</sup>.

Of the 19 patients with detrusor areflexia, 9 had urodynamic changes associated with risk for renal function deterioration.

This finding is similar with those of previous studies, which reported that a large number of patients with areflexia develop UTD<sup>12-14</sup>.

Scientific evidence shows discordance between clinical and urodynamic diagnoses. For this reason the urodynamic study is very important for to use a specific treatment and, to avoid incorrect diagnosis<sup>13-14</sup>.

The results of the present study showed a high prevalence of urodynamic changes associated with risk for upper urinary tract damage in neuroschistosomiasis patients. However, further studies involving larger samples are needed to confirm these findings.

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**Conflict of interest:** The authors declare that they have no conflicts of interest.

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