



## ORIGINAL ARTICLE

## Early treatment improves urodynamic prognosis in neurogenic voiding dysfunction: 20 years of experience<sup>☆,☆☆</sup>

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### KEYWORDS

Urinary incontinence;  
Neurogenic bladder;  
Urodynamics;  
Treatment;  
Kidney failure;  
Follow-up

### Abstract

**Objective:** To evaluate the association between early treatment and urodynamic improvement in pediatric and adolescent patients with neurogenic bladder.

**Methodology:** Retrospective longitudinal and observational study (between 1990 and 2013) including patients with neurogenic bladder and myelomeningocele treated based on urodynamic results. The authors evaluated the urodynamic follow-up (bladder compliance and maximum bladder capacity and pressure) considering the first urodynamic improvement in two years as the outcome variable and early referral as the exposure variable, using a descriptive and multivariate analysis with logistic regression model.

**Results:** Among 230 patients included, 52% had an early referral. The majority were diagnosed as overactive bladder with high bladder pressure ( $\geq 40$  cm H<sub>2</sub>O) and low bladder compliance (3 mL/cmH<sub>2</sub>O) and were treated with oxybutynin and intermittent catheterization. Urodynamic follow-up results showed 68% of improvement at the second urodynamic examination decreasing bladder pressure and increasing bladder capacity and compliance. The percentage of incontinence and urinary tract infections decreased over treatment. Early referral (one-year old

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<sup>☆☆</sup> Study carried out at Fundação Oswaldo Cruz (Fiocruz), Instituto Nacional de Saúde da Mulher, da Criança e do Adolescente Fernandes Figueira (IFF), Rio de Janeiro, RJ, Brazil.

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or less) increased by 3.5 the probability of urodynamic improvement in two years (95% CI: 1.81–6.77).

**Conclusion:** Treatment onset within the first year of life improves urodynamic prognosis in patients with neurogenic bladder and triplicates the probability of urodynamic improvement in two years. The role of neonatologists and pediatricians in early referral is extremely important. © 2017 Published by Elsevier Editora Ltda. on behalf of Sociedade Brasileira de Pediatria. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

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## PALAVRAS-CHAVE

Incontinência urinária;  
Bexiga neurogênica;  
Urodinâmica;  
Tratamento;  
Insuficiência renal;  
Follow-up

## Tratamento precoce melhora o prognóstico urodinâmico na disfunção miccional de origem neurogênica: 20 anos de experiência

### Resumo

**Objetivo:** Avaliar a associação entre tratamento precoce e melhora urodinâmica em pacientes pediátricos e adolescentes portadores de bexiga neurogênica.

**Metodologia:** Estudo observacional longitudinal retrospectivo (entre 1990-2013) em pacientes com bexiga neurogênica e mielomeningocele tratados com base no diagnóstico urodinâmico. Avaliamos a evolução urodinâmica (complacência, capacidade e pressão vesical) considerando primeira melhora urodinâmica em até dois anos como variável desfecho e encaminhamento precoce (primeira urodinâmica até um ano de vida) como exposição. Foi realizada análise descritiva e multivariada com modelo de regressão logística.

**Resultados:** Entre 230 pacientes incluídos 52% foram encaminhados precocemente. A maioria tinha bexiga hiperativa com pressão maior que 40 cmH<sub>2</sub>O, complacência abaixo de 3 ml/cmH<sub>2</sub>O e foitratadacom oxibutinina e cateterismo intermitente. Na evolução urodinâmica, 68% apresentou melhora já no segundo exame com redução da pressão e aumento da capacidade e da complacência vesical. O percentual de incontinência e infecção urinária diminuiu ao longo do tratamento. O encaminhamento precoce aumentou 3,5 vezes a probabilidade de melhora urodinâmica até dois anos em relação aos encaminhados após o primeiro ano de idade (CI95% 1,81-6,77).

**Conclusão:** Tratar no primeiro ano de vida melhora o prognóstico urodinâmico de pacientes com bexiga neurogênica, triplicando a probabilidade de melhora urodinâmica em até dois anos. A atuação do neonatologista e do pediatra, reconhecendo e encaminhando o paciente precocemente para o diagnóstico é extremamente importante.

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## Introduction

Chronic kidney disease (CKD) is a worldwide public health problem.<sup>1</sup> Evidence has confirmed the increase in cases, with millions of individuals being treated by renal replacement therapy – dialysis or kidney transplantation. Its prevalence in the world's population exceeds 10% and may reach 50% in high-risk subpopulations,<sup>2</sup> including patients with neurogenic bladder,<sup>3</sup> a neurological dysfunction of the lower urinary system that changes the phases of filling and emptying of the bladder. Neural tube congenital malformations, such as myelomeningocele, are the most frequent causes of neurogenic bladder in childhood. At least 25% of the most severe symptoms in pediatric urology are associated with neurogenic bladder.<sup>4</sup> Approximately 40% of children with neurogenic bladder develop some degree of renal impairment.<sup>5</sup>

The appropriate process of urination depends on the synergy between the bladder and the urinary sphincter complex. This allows the bladder to remain relaxed and under low pressure during the filling phase, which characterizes

bladder compliance. The emptying phase begins when the bladder capacity is reached, which generates a contraction of the bladder with elevation of the intravesical pressure, ideally up to 40 cmH<sub>2</sub>O, accompanied by sphincter relaxation, allowing complete emptying without post-void urinary residue.

The main risk factors for renal impairment related to the diagnosis of neurogenic bladder are increased pressure, reduced bladder capacity and compliance, detrusor sphincter dyssynergia, and post-void residue. To reduce renal morbidity, it is necessary to identify and treat these risk factors as early as possible. The urodynamic evaluation is recognized as the gold standard diagnostic method,<sup>6–9</sup> because it is the only examination capable of safely identifying these risk factors, assessing the coordination and pressure variations between the bladder, urethra, and sphincter complex and the integration between the bladder filling and emptying phases, identifying the causes of dysfunction, and guiding the appropriate treatment and follow-up of the disease.

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