

Bladder Dysfunction in Parkinson's Disease: A Contemporary Review

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Abstract

Bladder dysfunction is a common and clinically important non-motor manifestation of Parkinson's disease (PD). Urinary urgency, frequency, nocturia, and urgency urinary incontinence can substantially impair quality of life and may contribute to sleep disruption, falls, functional dependence, and caregiver burden. Management is challenging because patients with PD are often older and may have constipation, cognitive impairment, autonomic dysfunction, and gait abnormalities that increase the potential adverse effects of pharmacological treatment.

Recent evidence has highlighted the role of non-pharmacological treatment. A randomized noninferiority trial published in *JAMA Neurology* compared behavioral therapy with solifenacin in 77 individuals with PD and overactive bladder symptoms. Both interventions produced clinically meaningful improvement, and behavioral therapy was noninferior to drug therapy at 12 weeks. Dry mouth and falls were more frequently reported with pharmacological treatment. These findings support behavioral therapy as an important treatment option for overactive bladder in PD.

A comprehensive approach should include identification of the predominant urinary symptoms, exclusion of reversible causes, assessment of postvoid residual urine when indicated, behavioral interventions, and individualized pharmacological or advanced therapy. Treatment should consider motor function, cognition, constipation, fall risk, comorbidities, and patient preferences.

Keywords: Parkinson's Disease; Bladder Dysfunction; Overactive Bladder; Urinary Urgency; Nocturia; Urinary Incontinence; Pelvic-Floor Muscle Training; Solifenacin; Behavioral Therapy

Introduction

Parkinson's disease is a progressive neurodegenerative disorder characterized by both motor and non-motor manifestations. Autonomic dysfunction is common and includes gastrointestinal, cardiovascular, sexual, and urinary disturbances. Among these, lower urinary tract symptoms are particularly frequent and can become increasingly troublesome as the disease progresses.

The most common urinary manifestations include urgency, increased daytime frequency, nocturia, and urgency urinary incontinence. These symptoms can have a major impact on daily activities and quality of life. Nocturia may result in repeated sleep interruption, while urgency combined with impaired mobility can cause patients to rush to the bathroom and increase their risk of falls.

Despite their frequency, urinary symptoms are sometimes underreported or inadequately assessed. A systematic approach is therefore required to distinguish Parkinson-related bladder dysfunction from other urological and systemic causes.

Clinical features and pathophysiology

Bladder dysfunction in PD primarily affects the storage phase of micturition. Dysfunction of the neural pathways responsible for inhibition of the micturition reflex may contribute to detrusor overactivity and urinary urgency. Clinically, this may present as urgency, frequency, nocturia, and urgency incontinence.

However, urinary symptoms in PD are multifactorial. Bradykinesia, rigidity, freezing of gait, postural instability, cognitive impairment, and environmental barriers can make it difficult for patients to reach the toilet in time. Constipation, benign prostatic enlargement, urinary tract infection, diabetes, medications, and other urological disorders may also contribute.

Consequently, treatment should not assume that every urinary symptom is directly caused by Parkinson's disease. Careful clinical assessment is essential.

Assessment

Assessment should begin with a detailed history of urinary symptoms. Clinicians should determine the presence and severity of urgency, frequency, nocturia, urgency incontinence, hesitancy, weak urinary stream, and incomplete bladder emptying.

A bladder diary can be particularly useful because it records fluid intake, voiding frequency, voided volumes, nocturnal urination, and episodes of incontinence. Urinalysis should be performed when urinary infection or another urinary abnormality is suspected.

Measurement of postvoid residual urine is useful in patients with symptoms suggesting incomplete bladder emptying or urinary retention. Urodynamic investigation may be appropriate in selected patients when the diagnosis is uncertain, symptoms are refractory, or invasive treatment is being considered.

Assessment should also include constipation, mobility, cognition, falls, medication use, and the patient's ability to perform pelvic-floor exercises or other behavioral interventions.

Behavioral treatment

Behavioral treatment represents an important component of management. Interventions include pelvic-floor muscle training, bladder training, urge-suppression techniques, appropriate fluid management, reduction of bladder irritants, and timed voiding in selected patients.

Evidence from the *JAMA Neurology* trial

Vaughan and colleagues conducted a randomized noninferiority trial involving 77 individuals with Parkinson's disease and overactive bladder symptoms. Participants received either behavioral therapy or solifenacin for 12 weeks.

The behavioral intervention incorporated pelvic-floor muscle exercises and strategies for suppressing urinary urgency. The pharmacological group received solifenacin, beginning at 5 mg daily with escalation when appropriate.

Both groups demonstrated improvement in overactive bladder symptoms. The mean symptom score decreased from approximately 9 at baseline to approximately 6 after treatment. Behavioral therapy met the prespecified criterion for noninferiority compared with solifenacin.

The safety findings are clinically important. Dry mouth and falls were reported more frequently in the drug-treatment group, and some participants discontinued medication because of adverse effects.

These findings suggest that behavioral therapy should not be regarded merely as an adjunctive treatment. It can represent an effective therapeutic strategy in its own right, particularly for patients in whom anticholinergic adverse effects are a concern.

Pharmacological treatment

When behavioral interventions are insufficient, pharmacological therapy may be considered.

Antimuscarinic agents

Antimuscarinic medications, including solifenacin and other agents, reduce detrusor activity and can improve urgency, frequency, and urgency incontinence.

However, adverse effects are important in PD. Dry mouth and constipation are common, and cognitive effects, blurred vision, and urinary retention may occur. These considerations are especially relevant in older patients and those with cognitive impairment or a high risk of falls.

Therefore, antimuscarinic therapy should be individualized, with careful consideration of the patient's cognitive status, bowel function, mobility, and risk of urinary retention.

β 3-adrenergic agonists

β 3-adrenergic agonists such as mirabegron provide another pharmacological option for overactive bladder. They may be particularly useful when antimuscarinic treatment is poorly tolerated or undesirable. Blood pressure and other individual contraindications should be considered.

Nocturia

Nocturia is one of the most troublesome urinary symptoms in PD. It may result from bladder overactivity, reduced bladder capacity, nocturnal polyuria, excessive evening fluid intake, sleep disorders, or systemic conditions.

Management should therefore be directed at the underlying mechanism. General measures include appropriate management of evening fluid intake and reduction of bladder irritants. In selected patients with nocturnal polyuria, specific pharmacological treatment may be considered under appropriate monitoring.

Because nocturia can increase nighttime falls, attention should also be paid to bedroom and bathroom safety, lighting, walking aids, and the patient's mobility.

Advanced treatment

Patients with persistent symptoms despite conservative and oral treatment may require specialist urological assessment.

Potential options include intradetrusor botulinum toxin A and selected neuromodulation approaches. Botulinum toxin may be effective for refractory detrusor overactivity, but urinary retention can occur. In patients with PD, this is particularly important because cognitive or motor impairment may make intermittent catheterization difficult.

Advanced treatment should therefore be individualized and undertaken in collaboration with specialists experienced in both neurological and urological disorders.

Clinical implications

The current evidence supports a stepwise approach to bladder dysfunction in PD.

First, clinicians should identify the predominant urinary phenotype and exclude potentially reversible causes. Second, behavioral measures should be introduced early because they can improve symptoms without exposing patients to systemic drug adverse effects. Third, pharmacological treatment can be considered when symptoms remain clinically significant.

The randomized trial published in *JAMA Neurology* provides important evidence that behavioral therapy can produce improvements comparable to solifenacin over 12 weeks. This is particularly relevant in PD, where constipation, cognitive impairment, and falls can complicate antimuscarinic treatment.

Management should therefore focus not only on reducing urinary symptoms but also on improving sleep, mobility, independence, safety, and overall quality of life.

Limitations and Future Research

The available evidence remains limited. The *JAMA Neurology* randomized trial included only 77 participants and had a relatively short follow-up period of 12 weeks. Further research is needed to determine the long-term effectiveness and adherence to behavioral therapy.

Future studies should compare behavioral treatment with $\beta 3$ -adrenergic agonists and other pharmacological strategies, investigate combination therapy, and evaluate outcomes such as falls, sleep quality, caregiver burden, hospitalization, and long-term quality of life.

Research should also identify which clinical subgroups of patients with PD are most likely to benefit from specific bladder interventions.

Conclusion

Bladder dysfunction is a frequent and clinically significant non-motor manifestation of Parkinson's disease. Urgency, frequency, nocturia, and urgency urinary incontinence can substantially affect quality of life and may contribute to falls, sleep disturbance, and functional dependence.

The recent randomized evidence published in *JAMA Neurology* demonstrates that behavioral therapy based on pelvic-floor muscle exercises and urgency-suppression techniques can improve overactive bladder symptoms and was noninferior to solifenacin over 12 weeks.

These findings support behavioral therapy as an important early treatment strategy. Pharmacological and advanced treatments remain valuable for selected patients but should be prescribed with careful attention to cognition, constipation, urinary retention, falls, and other comorbidities.

A multidisciplinary, individualized approach involving neurology, urology, physiotherapy, and where appropriate pelvic-floor specialists is likely to provide the greatest benefit. Recognition and treatment of urinary dysfunction should therefore form an integral part of comprehensive Parkinson's disease care [1-4].

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