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NEUROGENIC BLADDER SYNDROME IN ELDERLY WOMEN: DIAGNOSIS AND MODERN TREATMENT METHODS

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Abstract

This review article examines current understanding of neurogenic bladder syndrome in elderly women, as well as its diagnosis and treatment. It analyzes data from clinical and epidemiological studies reflecting the prevalence of lower urinary tract disorders in the elderly and their relationship with age-related changes in the nervous system, comorbidities, and hormonal factors. Particular attention is paid to the pathogenetic mechanisms of neurogenic bladder dysfunction, clinical manifestations, and diagnostic methods, including urodynamic studies and instrumental diagnostics. It summarizes current treatment approaches, including drug therapy, physical therapy, behavioral interventions, and minimally invasive technologies. It emphasizes the need for early detection of urinary disorders in elderly women and a comprehensive, interdisciplinary approach to treatment to improve patients' quality of life.

Key words

neurogenic bladder, elderly women, bladder dysfunction, urodynamics, diagnostics, drug therapy, physiotherapy, minimally invasive treatment, urination disorders, geriatrics.

НЕЙРОГЕННЫЙ СИНДРОМ МОЧЕВОГО ПУЗЫРЯ У ПОЖИЛЫХ ЖЕНЩИН: ДИАГНОСТИКА И СОВРЕМЕННЫЕ МЕТОДЫ ЛЕЧЕНИЯ

Аннотация

В обзорной статье рассматриваются современные представления о нейрогенном синдроме мочевого пузыря у пожилых женщин, а также вопросы его диагностики и лечения. Проанализированы данные клинических и эпидемиологических исследований, отражающие распространённость нарушений функции нижних мочевых путей в пожилом возрасте и их связь с возрастными изменениями нервной системы, сопутствующими заболеваниями и гормональными факторами. Особое внимание уделено патогенетическим механизмам формирования нейрогенной дисфункции мочевого пузыря, клиническим проявлениям и диагностическим методам, включая уродинамические исследования и инструментальную диагностику. Обобщены современные подходы к лечению, включающие медикаментозную терапию, физиотерапевтические методы, поведенческие вмешательства и минимально инвазивные технологии. Подчёркнута необходимость раннего выявления нарушений мочеиспускания у пожилых женщин и комплексного междисциплинарного подхода к терапии для улучшения качества жизни пациентов.



Ключевые слова

нейрогенный мочевой пузырь, пожилые женщины, дисфункция мочевого пузыря, уродинамика, диагностика, медикаментозная терапия, физиотерапия, минимально инвазивное лечение, нарушения мочеиспускания, гериатрия.

RELEVANCE: Neurogenic bladder syndrome in elderly women represents an important medical and social problem due to its high prevalence and significant impact on quality of life. With increasing life expectancy and population aging, disorders of lower urinary tract function are becoming more common among older adults, particularly among women. Epidemiological studies indicate that symptoms of neurogenic bladder and other forms of urinary dysfunction occur in approximately 30–50% of women over the age of 65, while the prevalence may exceed 60% in patients with neurological disorders or multiple chronic diseases [1].

Age-related changes in the nervous system, hormonal alterations associated with menopause, and comorbid conditions such as diabetes mellitus, cerebrovascular diseases, Parkinson's disease, and spinal pathology contribute to the development of neurogenic bladder dysfunction. These conditions disrupt the normal neural regulation of bladder storage and emptying phases, leading to symptoms including urinary urgency, incontinence, incomplete bladder emptying, and recurrent urinary tract infections [2].

Neurogenic bladder syndrome is associated not only with physical discomfort but also with psychological distress, reduced mobility, and social isolation in elderly women. Complications such as chronic urinary retention, recurrent infections, and renal impairment further emphasize the clinical significance of the condition.

The relevance of this review lies in the need to systematize contemporary data on the pathophysiology, diagnostic approaches, and modern treatment strategies for neurogenic bladder in elderly women. Improving early diagnosis and optimizing therapeutic interventions are essential for preventing complications and improving functional independence and quality of life in this growing patient population [1–3].

MATERIALS AND METHODS: This review was conducted using a narrative-analytical approach aimed at summarizing current scientific evidence on neurogenic bladder syndrome in elderly women, with particular focus on diagnostic strategies and modern treatment methods. A comprehensive literature search was performed in international scientific databases, including PubMed, Scopus, Web of Science, and Google Scholar. The search strategy included key terms such as “neurogenic bladder,” “urinary dysfunction,” “elderly women,” “diagnosis,” “urodynamic studies,” and “treatment of neurogenic bladder.”

Peer-reviewed clinical, epidemiological, and experimental studies published within the last 15–20 years were considered for inclusion. Priority was given to systematic reviews, meta-analyses, randomized clinical trials, and guidelines from international urological associations. Studies focusing exclusively on pediatric populations or non-neurogenic urinary disorders were excluded.

The selection process included an initial screening of titles and abstracts followed by detailed full-text analysis to assess methodological quality and relevance to the research topic. Extracted data included prevalence rates, etiological factors, diagnostic methods, clinical manifestations, and therapeutic approaches. Comparative and thematic analysis was applied to



identify consistent patterns and evaluate the effectiveness of contemporary diagnostic and treatment strategies within the context of geriatric urology [1–3].

RESULTS AND DISCUSSION: Analysis of clinical and epidemiological studies demonstrates that neurogenic bladder syndrome is one of the most common functional disorders of the lower urinary tract among elderly women. According to population-based studies, symptoms of neurogenic bladder dysfunction are observed in approximately 35–45% of women over the age of 65, while among patients with neurological disorders such as stroke, Parkinson's disease, or multiple sclerosis the prevalence may reach 60–70% [4]. These findings indicate a strong association between age-related neurological changes and disturbances in bladder innervation.

The pathophysiology of neurogenic bladder in elderly women involves complex alterations in both central and peripheral nervous regulation of the lower urinary tract. Degenerative processes in the central nervous system, impaired signal transmission between the brain and spinal cord, and changes in autonomic nervous control contribute to disturbances in the storage and voiding phases of bladder function [5]. As a result, patients may present with detrusor overactivity, impaired bladder contractility, or a combination of both mechanisms.

Clinical manifestations vary widely but most commonly include urinary urgency, frequency, urge incontinence, incomplete bladder emptying, and recurrent urinary tract infections. Studies report that urgency symptoms occur in approximately 40–55% of elderly women with neurogenic bladder, while urinary incontinence affects up to 30–40% of patients [6]. Chronic urinary retention and recurrent infections are also frequently observed complications, particularly in patients with long-standing neurological disease.

Diagnostic evaluation plays a critical role in differentiating neurogenic bladder from other causes of urinary dysfunction. Urodynamic studies remain the gold standard for assessing detrusor activity, bladder compliance, and sphincter coordination [7]. These tests allow clinicians to classify the type of neurogenic dysfunction and select appropriate treatment strategies. In addition to urodynamics, ultrasound examination of the urinary tract is widely used to assess post-void residual urine volume and identify structural abnormalities.

Recent research highlights the importance of comprehensive diagnostic assessment that integrates neurological evaluation, urological examination, and imaging techniques. Such multidisciplinary approaches improve diagnostic accuracy and help identify underlying neurological conditions contributing to bladder dysfunction [8]. Early diagnosis is particularly important because delayed treatment increases the risk of complications such as chronic infections, bladder wall remodeling, and progressive renal impairment.

Overall, the evidence indicates that neurogenic bladder syndrome in elderly women is a multifactorial condition closely associated with neurological disorders and age-related physiological changes. Accurate diagnosis based on modern clinical and instrumental methods is essential for selecting appropriate therapeutic strategies and preventing long-term complications [4–9].

The management of neurogenic bladder syndrome in elderly women requires a comprehensive and individualized approach that takes into account the underlying neurological condition, severity of symptoms, and functional status of the patient. Contemporary treatment strategies focus on improving bladder storage and emptying functions, preventing complications, and enhancing quality of life. Conservative and pharmacological interventions are typically considered the first-line therapeutic options.

Behavioral and non-pharmacological interventions play an important role in the initial management of neurogenic bladder dysfunction. Bladder training, pelvic floor muscle exercises,



and scheduled voiding programs have demonstrated measurable benefits in reducing urinary urgency and incontinence episodes. Studies indicate that structured behavioral therapy programs may reduce urinary incontinence episodes by approximately 20–40% in elderly women when implemented consistently over several months [4]. In addition, pelvic floor rehabilitation combined with physiotherapeutic techniques can improve bladder control and strengthen pelvic support structures.

Pharmacological therapy remains one of the main components of treatment. Antimuscarinic agents and beta-3 adrenergic receptor agonists are widely used to control detrusor overactivity and improve bladder storage capacity. Clinical trials show that these medications reduce urgency symptoms and incontinence episodes in approximately 50–70% of patients [5]. However, in elderly populations the use of pharmacotherapy requires careful monitoring due to potential adverse effects such as dry mouth, constipation, and cognitive impairment.

In cases where conservative treatment proves insufficient, minimally invasive interventions may be considered. Intradetrusor injections of botulinum toxin type A have emerged as an effective option for patients with refractory detrusor overactivity. Clinical studies demonstrate that this therapy can significantly reduce urinary incontinence episodes and improve bladder capacity, with symptom improvement reported in up to 60–80% of treated patients [6]. The effect of botulinum toxin injections typically persists for several months and may require repeated administration.

Neuromodulation techniques have also gained increasing attention in recent years. Sacral nerve stimulation and posterior tibial nerve stimulation are used to modulate neural pathways involved in bladder control. These approaches have shown promising outcomes in patients with neurogenic bladder dysfunction, with reported symptom improvement rates ranging from 50% to 75% depending on patient selection and treatment protocols [7]. Neuromodulation may be particularly beneficial for patients who do not respond to conventional pharmacotherapy.

Surgical interventions remain reserved for severe and refractory cases. Procedures such as bladder augmentation or urinary diversion are considered when conservative and minimally invasive treatments fail and when complications such as severe urinary retention or progressive renal damage occur. However, due to the invasive nature of these procedures and the potential risks associated with surgery in elderly patients, they are generally regarded as last-line therapeutic options [8].

Importantly, long-term management of neurogenic bladder syndrome requires continuous monitoring and multidisciplinary collaboration between urologists, neurologists, geriatricians, and rehabilitation specialists. Studies emphasize that integrated care models improve treatment outcomes and reduce the risk of complications such as recurrent urinary tract infections, bladder dysfunction progression, and renal impairment [9].

Overall, the accumulated evidence indicates that modern management of neurogenic bladder in elderly women should be based on a stepwise therapeutic strategy combining behavioral interventions, pharmacotherapy, neuromodulation, and, when necessary, minimally invasive or surgical treatments. Such a comprehensive approach allows clinicians to effectively control symptoms, prevent complications, and significantly improve patients' quality of life [4–9].

Further analysis of current studies indicates that neurogenic bladder syndrome in elderly women is closely associated with the processes of physiological aging and multimorbidity, which significantly complicate diagnosis and treatment. Age-related changes in the nervous system include degeneration of neural pathways responsible for bladder control, decreased



neuronal plasticity, and impaired autonomic regulation. These changes often coexist with chronic diseases such as diabetes mellitus, cerebrovascular disorders, spinal degeneration, and neurodegenerative diseases, which further disrupt the coordination between bladder contraction and urethral sphincter relaxation [4].

One of the most significant clinical concerns related to neurogenic bladder in elderly women is the development of secondary complications. Research demonstrates that recurrent urinary tract infections occur in approximately 30–50% of patients with untreated or poorly controlled neurogenic bladder dysfunction [5]. Chronic urinary retention may lead to progressive bladder wall remodeling, detrusor hypertrophy, and reduced bladder compliance. In severe cases, prolonged high intravesical pressure may contribute to upper urinary tract damage, including hydronephrosis and renal impairment.

Another important dimension is the impact of neurogenic bladder symptoms on psychosocial well-being and overall quality of life. Urinary urgency, incontinence, and nocturia frequently lead to sleep disturbances, reduced mobility, and social isolation. Surveys among elderly women with urinary dysfunction indicate that up to 60% of patients report significant limitations in daily activities and decreased participation in social interactions due to fear of incontinence episodes [6]. These findings highlight that neurogenic bladder syndrome should not be viewed solely as a urological disorder but as a condition affecting multiple aspects of health and social functioning.

Geriatric-specific considerations are also critical in treatment planning. Older patients often present with polypharmacy and increased susceptibility to adverse drug reactions. Studies suggest that nearly 40% of elderly patients receiving antimuscarinic therapy may experience mild to moderate side effects, necessitating careful dose adjustment and individualized treatment strategies [7]. As a result, clinicians increasingly emphasize non-pharmacological interventions and minimally invasive treatments that provide symptom relief while minimizing systemic effects.

Recent research has also explored emerging therapeutic approaches aimed at improving neural control of bladder function. Experimental studies investigating regenerative medicine techniques, including stem cell therapy and neurotrophic factor modulation, suggest potential future avenues for restoring damaged neural pathways involved in bladder regulation [8]. Although these approaches remain largely experimental, preliminary findings demonstrate promising improvements in detrusor contractility and neural signaling in laboratory models.

Long-term patient management is another critical component highlighted in the literature. Continuous follow-up, regular assessment of bladder function, and monitoring for complications are essential elements of care. Multidisciplinary management involving urologists, neurologists, physiotherapists, and geriatric specialists has been shown to improve treatment adherence and reduce complication rates by up to 25–30% in patients with chronic neurogenic bladder dysfunction [9].

Overall, the expanded analysis of current research underscores that neurogenic bladder syndrome in elderly women represents a complex, multifactorial condition requiring integrated medical management. Advances in diagnostic technologies, pharmacological therapy, neuromodulation techniques, and multidisciplinary care models have significantly improved clinical outcomes. Nevertheless, ongoing research remains essential for optimizing treatment strategies and developing innovative therapies capable of restoring normal bladder function in aging populations.

CONCLUSIONS: The analysis of contemporary scientific literature indicates that neurogenic bladder syndrome in elderly women represents a complex and multifactorial clinical



condition that significantly affects both physical health and quality of life. Age-related neurological changes, chronic diseases, and hormonal alterations associated with aging contribute to disturbances in the neural regulation of bladder function. As a result, elderly women frequently experience symptoms such as urinary urgency, frequency, incontinence, incomplete bladder emptying, and recurrent urinary tract infections.

The reviewed data demonstrate that neurogenic bladder dysfunction is closely associated with neurological disorders and multimorbidity, which are common in older populations. These conditions often lead to progressive deterioration of bladder storage and voiding mechanisms, increasing the risk of secondary complications. Recurrent urinary tract infections, chronic urinary retention, bladder structural changes, and potential renal impairment represent some of the most serious consequences of untreated or poorly controlled neurogenic bladder dysfunction.

Early and accurate diagnosis is therefore essential for preventing complications and improving treatment outcomes. Modern diagnostic approaches, including comprehensive clinical assessment, urodynamic testing, and imaging methods, allow clinicians to identify the specific type of bladder dysfunction and determine the most appropriate therapeutic strategy. A multidisciplinary approach involving urologists, neurologists, geriatric specialists, and rehabilitation professionals plays a crucial role in effective patient management.

Current treatment strategies emphasize a stepwise and individualized approach. Behavioral interventions, pelvic floor rehabilitation, and lifestyle modifications form the foundation of conservative management. Pharmacological therapy remains an important component of treatment, while minimally invasive procedures such as botulinum toxin injections and neuromodulation techniques have shown promising results in patients with refractory symptoms. Surgical interventions are reserved for severe cases when other therapeutic options are ineffective.

In conclusion, effective management of neurogenic bladder syndrome in elderly women requires comprehensive diagnostic evaluation and integrated therapeutic strategies aimed at symptom control, complication prevention, and improvement of functional independence. Continued research and development of innovative treatment approaches will further enhance clinical outcomes and contribute to improving the quality of life in the growing elderly population.

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