Micturition Disorders

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KEYWORDS

• Incontinence • Dysuria • Urethral obstruction • Overactive bladder • Urine retention

KEY POINTS

- Differentiation of conscious versus unconscious voiding is important to determine the cause of micturition disorders.
- It is important to determine whether the clinical signs are caused by a disorder of storage or a disorder of voiding.
- Observation of the patient while urinating is key to diagnosing disorders of voiding.
- Patients with disorders of voiding have difficulty fully emptying the bladder and can have overflow incontinence.
- Patients with disorders of storage can have urinary incontinence or increased frequency of urination caused by decreased storage capability.

Video of functional outflow obstruction accompanies this article at www.vetsmall.theclinics.com/

INTRODUCTION

Physiology of Micturition

The primary purpose of the lower urinary tract is to store urine and to facilitate its elimination at an appropriate time. The bladder is in storage phase 99% of the time and in emptying phase only 1% of the time. Coordination of storage and emptying requires a complex interaction between the somatic and autonomic nervous systems, as well as normal function of the organs and tissues involved.

All 3 components of the peripheral nervous system are involved in the micturition cycle (Table 1). In addition, conscious voiding involves the lumbar and sacral spinal cord as well as the brainstem and cerebral cortex (Fig. 1).

During filling and storage, stretch receptors in the bladder wall send afferent signals along the pelvic nerve, which activate a reflex arc through the hypogastric nerve to the urethra (Fig. 2). Norepinephrine is released by postganglionic neurons to activate

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Table 1
Peripheral nervous system components of micturition

Type (Receptor)	Location	Nerve	Function When Stimulated	Function When Blocked	Function When Inappropriately Stimulated	Function When Inappropriately Blocked
Parasympathetic (M_3 muscarinic)	Bladder body (detrusor)	Pelvic nerve (S1–S3)	Contraction and bladder emptying	Detrusor relaxation and bladder filling	Overactive bladder	Bladder atony, urine retention
Sympathetic ($beta_3$-adrenergic)	Bladder body (detrusor)	Hypogastric nerve (L1–L4)	Detrusor relaxation and filling	Detrusor contraction and urination	Urine retention	Decreased bladder compliance and increased filling pressure
Sympathetic ($alpha_1$-adrenergic)	Bladder neck/ urethra	Hypogastric nerve (L1–L4)	Contraction and continence	Urination	Urine retention	Open urethra, incontinence
Somatic (nicotinic)	Distal urethra/ pelvic floor	Pudendal nerve (S1–S2)	Conscious/reflex contraction and continence	Urination	Urine retention	Open urethra, incontinence