



Clinical Pharmacology & Toxicology Pearl of the Week

~ Drug-induced Urinary Retention ~

- ✓ Drug-induced urinary retention is very common and can be caused by many classes of medications.
- ✓ It may occur more often in men due to concurrent prostate hypertrophy but should be considered in women as well.
- ✓ Micturition and bladder control are coordinated at multiple levels of the nervous systems, including:
 - the central pontine micturition center
 - the autonomic nervous system (remember: "Parasympathetic makes you Pee")
 - the somatic nervous system

Micturition occurs via:

1. Detrusor muscle contraction due to acetylcholine (ACh), which binds the type-3 muscarinic receptor (M3).
 2. Internal urethral sphincter relaxation due to decreased sympathetic input to both alpha 1 and beta 3 receptors.
 3. External urethral sphincter relaxation via decreased ACh- mediated activity of Nicotinic (N) receptors.
 4. Localized prostaglandin signalling.
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- ✓ Any medication that acts centrally or peripherally to modulate serotonin, norepinephrine or acetylcholine neurotransmission (including receptor agonism/ antagonism) can lead to alterations in normal micturition.

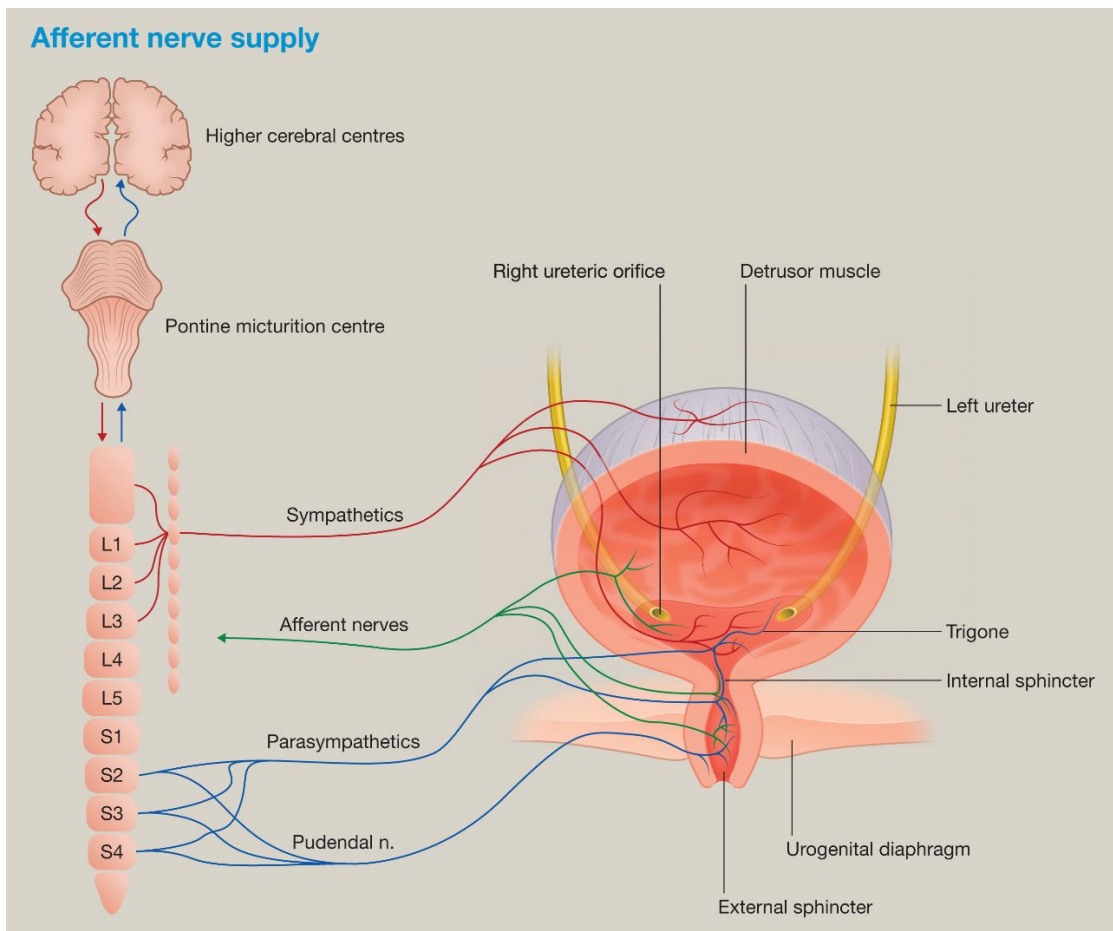


Table 1: Drug Classes Causing Urinary Retention

<u>Drugs causing urinary retention</u>	<u>Example medications</u>	<u>Mechanism</u>
Anticholinergic drugs	<ul style="list-style-type: none">- TCAs (amitriptyline, nortriptyline)- tiotropium- diphenhydramine- dimenhydrinate	Impaired detrusor contraction, leading to poor bladder emptying
Opioids	All opioids	<ul style="list-style-type: none">- Impaired detrusor relaxation- Decreased neurotransmission of bladder fullness- Increased external sphincter tone
alpha & beta agonists	<ul style="list-style-type: none">- Phenylephrine, oxymetazoline (alpha 1)- Salbutamol, sympathomimetics (beta and alpha)	Impaired detrusor contraction + impaired sphincter relaxation.
GABA-ergic drugs	Benzos, baclofen, barbiturates, propofol	Largely due to muscle relaxation & inhibitory effects
NSAIDs	All NSAIDs	Alteration of prostaglandins that mediate muscle contraction and relaxation
Calcium channel blockers	Amlodipine, nifedipine, gabapentin	Relaxation of smooth muscle leading to impaired contraction (can cause incontinence too)
SSRI/SNRI drugs	All SSRIs/SNRIs have this potential	Serotonin is the main neurotransmitter modulating micturition both centrally and peripherally.

References:

1. Verhamme, K.M.C., Sturkenboom, M.C.J.M., Stricker, B.H.C. et al. Drug-Induced Urinary Retention. *Drug-Safety* (2008) 31: 373.

The Clinical Pharmacology (CP) physician consultation service is available Mon-Fri, 8am-5pm. The on-call physician is listed in ROCA on the AHS Insite page. CP consultations are also available through Netcare e-referral and Specialist Link. You can also find us in the [Alberta Referral Directory](#) (ARD) by searching "Pharmacology" from the ARD home page. Click [HERE](#) for more details about the service.

The Poison and Drug Information Service (PADIS) is available 24/7 for questions related to poisonings. Please call 1-800-332-1414 (AB and NWT) or 1-866-454-1212 (SK). Information about our outpatient Medical Toxicology Clinic can be found in [Alberta Referral Directory](#) (ARD) by searching "Toxicology" from the ARD home page.

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