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Lesson 7 Volume 39

Understanding and Managing Post-Micturition Dribbling: Lessons Learned from Male LUTS Clinics*

Learning Objective: At the conclusion of this continuing medical education activity, the participant should be able to appreciate the prevalence and impact of post-micturition dribbling in men, determine its probable etiology, learn a proposed classification system, identify the various mechanisms and apply this knowledge to better manage the condition.

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***This AUA Update addresses the Core Curriculum topics of BPH and Urinary Incontinence and Overactive Bladder, and the American Board of Urology Module: Neurogenic Bladder, Voiding Dysfunction, Female Urology, BPH and Urethral Stricture.**

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INTRODUCTION

Post-micturition dribbling, the involuntary loss of urine immediately after an individual finishes passing urine,[1] is one of the most commonly reported lower urinary tract symptoms in men yet remains misunderstood and poorly treated. This post-micturition symptom typically occurs after the male leaves the toilet and differs from terminal dribbling, as the voiding symptom of a prolonged obstructive flow results in a final flow slowing to a trickle or dribble. Post-micturition dribbling occurs in men with LUTS/benign prostatic hyperplasia, chronic prostatitis/chronic pelvic pain syndrome or lower urinary tract disease, following radical prostatectomy and without any defined urological pathology. It is a bothersome and embarrassing symptom for young and old men. **Since post-micturition dribbling does not differentiate men with BPH related LUTS from those without clinical LUTS/BPH, it is not captured in the AUA BPH Symptom Score/International Prostate Symptom Score.[2]** Yet post-micturition dribbling not only appears to be present when physicians inquire, but also is reported spontaneously by patients sometimes as a solitary bothersome symptom.

The large number of patients presenting to our male LUTS/BPH and CP/CPPS clinics as well as our general urology clinic with bothersome post-micturition dribbling has prompted us to take this symptom more seriously. In this Update we review the literature and our own anecdotal experience regarding the prevalence, etiology, impact, evaluation and management of post-micturition dribbling. The proposed mechanisms, categorization, assessment and management of this condition rely on this foundation and the well established Osler based methodology of listening to patients describe their experience with this bothersome yet almost ignored lower urinary tract symptom.[3] An excellent and comprehensive contemporary review of this condition has recently been published.[4]

PREVALENCE

The literature regarding the prevalence of post-micturition dribbling has been sparse, not only because this symptom is not captured in most validated questionnaires (such as the International Prostate Symptom Score), but also because the definition has never been standardized or validated, and descriptions in the literature appear to vary greatly. **In various surveys post-micturition dribbling has been reported in 5.5% to almost 60% of men, with prevalence increasing with age and diagnosis of LUTS/BPH (see table).[4-12]** Of the BACH (Boston Area Community Health) survey cohort 8.7% reported post-micturition dribbling.[6] Although 16.9% of men reported post-micturition symptoms in the EPIC (EPidemiology of InContinence) study, post-micturition dribbling was classified in only 5.5%.[5]

Post-micturition dribbling rates have been reported as high as 65% in men presenting with erectile dysfunction[13-15] and is even more prevalent in those with LUTS/BPH.[12, 16] Recently, in the comprehensive National Institutes of Health LURN (Lower Urinary Tract Dysfunction Research Network) study 44% of American men presenting with LUTS reported post-micturition dribbling.[17] Subsequent cluster analyses revealed that 92 of 503 care seeking men in the LURN study clustered to a group that mainly endorsed post-micturition symptoms (eg post-void dribbling and post-void leakage).[18] We are not aware of any studies indicating an increase in post-micturition dribbling prevalence in younger men with CP/CPPS, although it is our anecdotal experience that this is the case. Post-micturition dribbling has been described as one of the most bothersome LUTS in men, after urge incontinence,[7, 19] and it appears to be more bothersome in younger men.[10] **When reported, post-micturition dribbling appears to result in measureable decreased quality of life, with impairment of physical and mental health related issues.[6, 11, 17]**

ETIOLOGY

The comprehensive 2-volume report from the 6th International Consultation on Incontinence[20] and the multiauthored definitive textbook *The Urinary Sphincter*[21] do not even mention the symptom of post-micturition dribbling. Based on the literature and our own experience there seems to be 3 distinct categories of this entity, each of which is associated with different mechanisms and management strategies. **All entities are related to urine trapped in the urethra. One mechanism is related to distal urethral obstruction, and the other two are related to urine temporarily trapped in the prostatic urethra and the bulbar urethra**. A suggested categorization system of post-micturition dribbling is presented in Appendix 1.

Category 1—penile urethral trapping. With appropriate diag-

Table. Prevalence of post-micturition dribbling in various population based studies

Study	Location	No. Male Subjects (age)	% Post-Micturition Dribbling
EPIC[5]	Canada, Germany, Italy, Sweden, United Kingdom	8000 (≥18 yrs)	5.5
BACH[6]	Boston	2300 (30-79 yrs)	8.7
Population based LUTS survey[7]	China	1500 (≥18 yrs)	9.4
EpiLUTS[8]	U.S., United Kingdom, Sweden	14,000 (>18 yrs)	29.7
Multinational cross-sectional survey[9]	Southeast Asia	1500 (≥18 yrs)	55.0
TAMUS[10]	Finland	7000 (30-80 yrs)	58.1

ABBREVIATIONS: BPH (benign prostatic hyperplasia), CP (chronic prostatitis), CPPS (chronic pelvic pain syndrome), ED (erectile dysfunction), LUTS (lower urinary tract symptoms), PDE5 (phosphodiesterase type 5)

nostic evaluation, cases are identified by urethral pathology consisting of severe phimosis, urethral meatal or fossa navicularis scarring/stenosis, penile urethral stricture or urethral diverticula. The pathological process traps urine in the penile and/or bulbar urethra (or diverticulum), which slowly drips out of the urethra beginning immediately after urinating and continuing until the urethra is empty.[22]

Category 2—prostatic urethral trapping. In these cases urine becomes trapped between the internal sphincter (bladder neck) and external sphincter. In a young normal male there is coordinated synergy between the openings of the internal followed by the external sphincter with voiding, and reverse closing of the external sphincter followed by the internal sphincter after voiding. In men with dyssynergia or incoordination of this process urine can become trapped in the prostatic urethra between the 2 sphincters. This condition can occur in men with bladder neck hypertrophy/hypertonia/stenosis, CP/CPPS, lower urinary tract neuropathy or idiopathic external sphincter dyssynergia. It can also conceivably be caused by the longer urethra in men with benign prostatic enlargement. The involuntary internal sphincter remains closed and the external sphincter is voluntarily kept closed but the uncomfortable sensation of the trapped urine in the prostatic urethra eventually leads to external sphincter relaxation and subsequent post-void dribbling of urine, typically a few seconds or longer (even minutes) after urinating.

Another hypothesis, particularly in men with a shorter prostatic urethra and normal bladder neck, is that urine trapped in the urethra that normally may be drawn back into the bladder ("milk-back") falls into the bulbar urethra ("milk-out") because of an incompetent external urethral sphincter.[4] Of 15 men with post-micturition dribbling who underwent urodynamic studies urine failed to milk-back from the prostatic urethra in 5, including 3 patients with bladder instability and 1 with classic bladder neck stenosis.[23]

Category 3—bulbar urethral trapping. This etiological mechanism can be as simple as a bulbar urethral stricture but otherwise appears to be associated with some form of neuromuscular dysfunction of the bulbar urethra or, alternatively, weakness of the bulbocavernosus and/or ischiocavernosus muscle. These structures have been postulated to be involved in the milk-out of urine from the bulbar urethra.[4, 13] Of 15 men with post-micturition dribbling 7 had no urodynamic abnormalities but significant urine was temporarily trapped in the bulbar urethra after voiding.[23] However, in another series of similar patients electromyography was unable to identify any bulbocavernosus muscle abnormalities.[24]

Special situations. Post-Radical Prostatectomy: **Post-micturition dribbling is reported to be significantly more prevalent after radical prostatectomy and appears to be related to defective milk-out of urine from the bulbar urethra.** Voiding cystourethrography before and after radical prostatectomy revealed post-micturition dribbling, which the authors attributed to surgery induced injury to the bulbocavernosus and ischiocavernosus muscles in 86% of patients without milk-out postoperatively.[25]

Association with Erectile Dysfunction: **A number of studies have shown an association between ED and post-micturition dribbling.[13-15]** It has been hypothesized that the link between these conditions may be a weakened urethro-corporocavernosal reflex, which may be involved in tumescence and bulbar urethral emptying (milk-out). The other explanation is that since pelvic floor muscle function is important for sexual activity and normal bulbar urethra functioning, pelvic floor dysfunction may increase the risk of ED and post-micturition dribbling.

High Zipper Syndrome: Another unique explanation for post-micturition dribbling in some men is urination at an acute or obstructed angle through a high and tight zipper fly or tight underwear elastic waistband.[26] Since the urine cannot drain back into the bladder, it starts to dribble out of the urethra almost immediately after urinating.

Post-Micturition Convulsion Syndrome: This interesting syndrome associated with post-micturition dribbling has also been called post-micturition tremor, or "piss shivers" by patients. This well described (not in the medical literature, but rather on the Internet) phenomenon is characterized by shivering during or after urination, sometimes causing abnormal post-micturition incontinence. The most plausible theory is related to a malfunction of the autonomic nervous system with a mix-up of normal interaction between the sympathetic and parasympathetic nervous systems during voiding.[27] The shivering may occur due to the abnormal release of catecholamines.

EVALUATION

It is important to identify the mechanism of post-micturition dribbling in each patient, which is suggested by history. Conditions that need to be considered are LUTS and/or LUTS/BPH (particularly obstructive voiding symptoms); ED; timing after urinating (early, late or continuous); prostatic, pelvic or perineal pain (eg CP/CPPS); history of genitourinary trauma; infection and/or stricture disease. A focused physical examination includes assessment of the pelvis, pelvic floor and other genitourinary pain, abnormalities of the external genitalia and digital rectal examination including an assessment of anal/pelvic floor tone. Further investigations are informed by the history and physical examination, and could include cystoscopy, retrograde and/or voiding cystourethrography, ultrasound and urodynamics (pressure flow study, videourodynamics and even sphincter electromyography). It has been reported that endoscopic and/or urodynamic investigation is of value only in those patients with multiple LUTS.[28] A specific post-micturition dribbling survey, the Hallym Post-Micturition Dribble Questionnaire, has recently been described.[29, 30] An evaluation algorithm is shown in the figure.

MANAGEMENT

Management should depend on the etiological mechanism in the individual presenting with post-micturition dribbling. Suggested treatments for each category of post-micturition dribbling are shown in Appendix 2.

Category 1. Patients with obvious urethral pathology usually require surgery, which can include circumcision, meatal dilation/meatoplasty, internal urethrotomy/urethroplasty or urethral diverticulectomy. Relief of related post-micturition dribbling will depend on the success of the ameliorative surgery. A recent report confirmed that patients with urethral stricture disease and post-micturition dribbling experience considerable improvement after successful urethroplasty.[22]

Category 2. Prostatic urethral urine trapping can be treated primarily or secondarily. Patients with bladder neck abnormalities may benefit from primary therapy with alpha blockers or bladder neck incision. In our experience bladder neck surgery in men with demonstrable bladder neck obstruction (identified

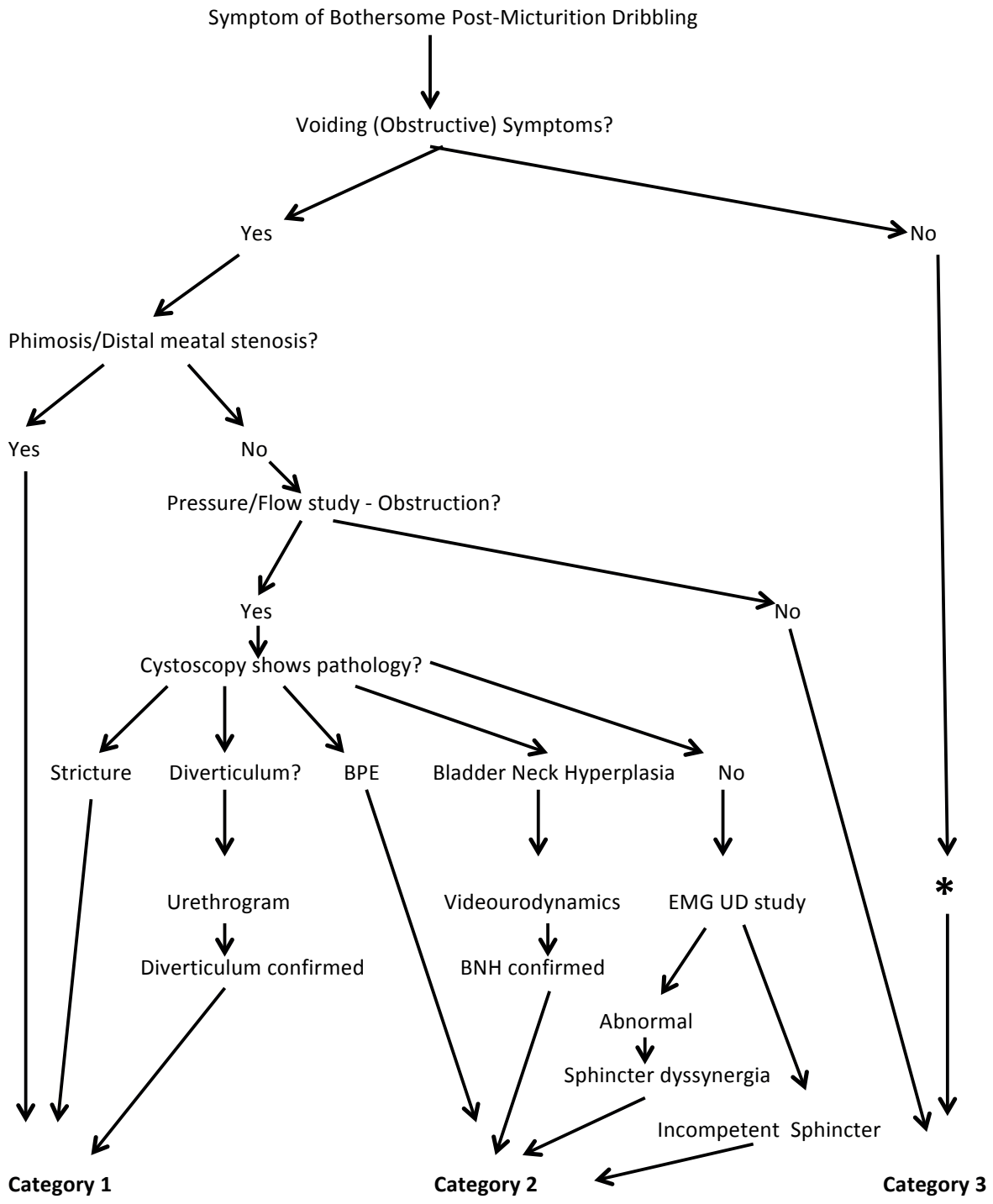

Figure. Evaluation of post-micturition dribbling. Asterisk indicates dynamic voiding urethrography should be considered to confirm bulbar urethral urine trapping (usually unnecessary). *BPE*, benign prostatic enlargement. *EMG*, electromyography. *UD*, urodynamic. *BNH*, benign nodular hyperplasia.

by pressure flow study, videourodynamics and/or cystoscopy) is more effective for treating post-micturition dribbling, although it may be problematic or even contraindicated in young men because the procedure may result in retrograde ejaculation. For patients diagnosed with LUTS/BPH associated with benign prostatic enlargement, standard treatment of LUTS, such as medical therapy (eg alpha blockers and/or 5-alpha-reductase inhibitors), transurethral resection of the prostate or a minimally invasive surgical procedure, may reduce post-micturition dribbling. It has been our experience that post-micturition dribbling associated with LUTS/BPH is refractory to standard BPH therapy, and that other secondary treatment maneuvers may still be required.

Recent findings suggest that PDE5 inhibitors may benefit men with post-micturition dribbling and LUTS. A biofeedback strategy is worth considering for patients with urodynamically

proven sphincter dyssynergia. Pelvic floor physiotherapy may be helpful for teaching relaxation of the related external sphincter muscle. We have had success in patients with this condition associated with a diagnosis of CPPS and high voiding pressures. Secondary treatment relies on counseling patients to wait after voiding, relax the pelvic floor (and external sphincter), let urine drip while still waiting at the urinal and attempt urethral milking, which probably relaxes the external sphincter.

Category 3. It was generally believed that no medical or surgical therapy was available for bulbar urethral urine trapping. This situation may have changed recently based on new understanding of the relationship between post-micturition dribbling and ED as well as LUTS. PDE5 inhibitors in the treatment of post-micturition dribbling and other associated LUTS have been evaluated in 2 separate randomized placebo controlled studies performed by Korean investigators. Daily use of udenafil (a PDE5 inhibitor available in Korea) was assessed for post-micturition dribbling in 130 men randomized to 75 mg udenafil once daily or placebo using Hallym Post-Micturition Dribble Questionnaire score as the primary outcome. Over time the udenafil group showed significant improvement in post-micturition dribbling score compared to the placebo group.

In another randomized, placebo controlled study Yang et al assessed 5 mg tadalafil once daily in 102 men presenting with LUTS and post-micturition dribbling.[30] The 12-week study showed that almost two-thirds of the tadalafil group experienced improvement in post-micturition dribbling compared to almost a third of the placebo group based on the Hallym Post-Micturition Dribbling Questionnaire. These recent studies suggest that it may be appropriate to offer a trial of PDE5 inhibitors in men with post-micturition dribbling associated with LUTS and/or ED.

Patients are counseled as described for secondary treatment of prostatic urethral urine trapping. The urethral milking strategy, often discovered by patients serendipitously, includes manually milking the urethra from the proximal bulbar urethra to the distal bulbar urethra or even more distally into the penile urethra. Some patients describe penile shaking techniques that they subjectively believe add to the efficacy. This is likely a learned behavior for management of post-micturition dribbling but it cannot be discounted. These techniques require the patient to remain at the urinal until after the trapped urine is drained from the urethra (urinal wait time strategy). **This most conservative approach, the "milk, shake and wait maneuver," remains the mainstay of conservative therapy for this group of men.**

Directed pelvic floor physiotherapy combined with perineal physiotherapy and associated exercises to improve pelvic floor muscle strength and contractions appears beneficial in patients with identified pelvic floor dysfunction or weakness. In 36 (65.5%) patients with ED and post-micturition dribbling pelvic floor exercises were an effective treatment compared to lifestyle changes only in 19 control group patients.[13] The objective is to contract the pelvic floor muscle to squeeze out the bulbar urethral urine, thus assisting bulbar urethra milk-out. This technique should theoretically lead to improvement in post-micturition dribbling after radical prostatectomy. Paradoxically this therapy may exacerbate the condition in patients with category 2 post-micturition dribbling. Some men report that sitting helps ameliorate the problem but this only appears to be worthwhile in those with LUTS/BPH.[31] When all else fails, use of an incontinence pad will help prevent wet clothes.

SUMMARY

Wet pants after urinating is a complaint that urologists hear on a regular basis from men of all ages. Some research has been undertaken regarding the symptom of post-micturition dribbling but our understanding of the condition and current management approaches are still based more on anecdotal experience than on scientific evidence. However, it is apparent that at least 3 mechanisms of post-micturition dribbling exist related to urethral pathology or physiological urine trapping in the penile, prostatic or bulbar urethra. Post-micturition dribbling can be placed into one of these categories based on standard urological evaluation. Selecting management based on this mechanistic classification will likely lead to improved results, particularly now that randomized placebo controlled trials have been undertaken. More research into this nebulous but bothersome lower urinary tract symptom is certainly warranted.

DID YOU KNOW?

- Post-micturition dribbling is a prevalent, bothersome and neglected lower urinary tract symptom that is more common with age and development of benign prostatic hyperplasia.
- Post-micturition dribbling mechanisms are related to urine trapped in the urethra presenting as distal urethral obstruction and/or urine temporarily trapped in the prostatic urethra and bulbar urethra.
- It important to identify the mechanism or category of post-micturition dribbling in each patient, which is suggested by history, and confirmed by physical examination and specific ancillary investigations.
- Effective management depends on the etiological mechanism in the particular individual presenting with post-micturition dribbling and can include surgery, medications, physiotherapy and conservative measures such as the milk, shake and wait maneuver.

Appendix 1. Proposed classification of post-micturition dribbling based on possible etiological mechanisms

Category	Description	Mechanism
Category 1	Penile urethral pathology	Phimosis, meatal or fossa navicularis stenosis, urethral stricture, urethral diverticulum, other (urethral cancer, stone, polyp etc)
Category 2	Prostatic urethral urine trapping	Bladder neck hypertrophy/hypertonia, benign prostatic enlargement, chronic pelvic pain syndrome, sphincter dyssynergia
Category 3	Bulbar urethral urine trapping	Bulbar urethral stricture, bulbar urethral neuromuscular dysfunction

Appendix 2. Suggested therapies (all categories include pelvic floor/perineal relaxation and urinal wait time strategy)

Specific Condition (category No.)	Suggested Therapy
Penile urethral pathology (1):	
Phimosis	Circumcision
Meatal/fossa navicularis stenosis	Meatoplasty
Urethral stricture	Internal urethrotomy, urethroplasty
Urethral diverticulum	Resection of diverticulum
Other (urethral cancer, stone, polyp etc)	Surgery for specific condition
Prostatic urethral urine trapping (2):	
Bladder neck obstruction	Alpha blockers, bladder neck incision
Benign prostatic enlargement	Alpha blockers, 5-alpha-reductase inhibitors, PDE5 inhibitors, transurethral prostatectomy, minimally invasive surgery
Chronic pelvic pain syndrome	Alpha blockers, antibiotics, anti-inflammatories etc
Sphincter dyssynergia	Physiotherapy, biofeedback
Bulbar urethral urine trapping (3):	
Bulbar urethral stricture	Internal urethrotomy, urethroplasty
Bulbar urethral neuromuscular dysfunction	Urethral milking maneuver, penile shaking maneuver, urinal wait time strategy, PDE5 inhibitors (daily tadalafil), pelvic floor physiotherapy/exercises

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Study Questions Volume 39 Lesson 7

1. The mechanism of action shown to improve post-micturition dribble in men in randomized placebo controlled studies is
   a. 5-alpha-reductase inhibition
   b. alpha-adrenergic blockade
   c. phosphodiesterase inhibition
   d. skeletal muscle relaxation

2. Post-micturition dribble is defined
   a. as a storage symptom
   b. as a prolonged flow slowing to trickle or dribble
   c. as the involuntary loss of urine immediately after finishing passing urine
   d. by a specific score on the International Prostate Symptom Score (AUA Symptom Score)

3. The pathophysiological mechanism of post-micturition dribble is primarily related to
   a. urinary obstruction
   b. overactive bladder
   c. urinary sphincter incompetence
   d. residual urine trapped in the urethra

4. Milk-back refers to urine
   a. in the prostatic urethra drawn back into the bladder
   b. manually massaged from the proximal bulbar urethra into the bladder
   c. forced back into the bladder from a strong bulbar urethral muscle reflex
   d. trapped in the urethra because of a high zipper or from a tight elastic underwear waistband

5. The most commonly advocated treatment of post-micturition dribble has traditionally been
   a. post-micturition bulbar urethral massage
   b. milk, shake and wait maneuver
   c. physiotherapy
   d. alpha blockers

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