

MANAGEMENT OF URINARY INCONTINENCE IN WOMEN

Definitions:

(**Simple incontinence** = associated with activities and/or urgency / frequency.)

Stress Incontinence: Leaking with coughing, sneezing or laughing

Urge Incontinence: Leaking on the way to the bathroom

Overactive Bladder: Desperate urgency to empty the bladder, often accompanied by large-volume leakage and usually waking in the night with the need to urinate.

(**Complicated incontinence** = associated with pain, infection, poor stream or stop-start voiding, pelvic irradiation, or radical surgery, or suspected fistula.)

DID YOU KNOW?

- 26% of women aged 30 – 59 (mostly within the 40 – 49 age range) have some type of urinary incontinence!

THE INTEGRATED CONTINENCE SYSTEM (developed by physiotherapists Heather Grewar & Linda McLean in Kingston, Ontario)... an evidence-based model...

- Defines the **STRUCTURAL** components for Urinary Continence &
- The **MODIFIABLE** components for Urinary Continence

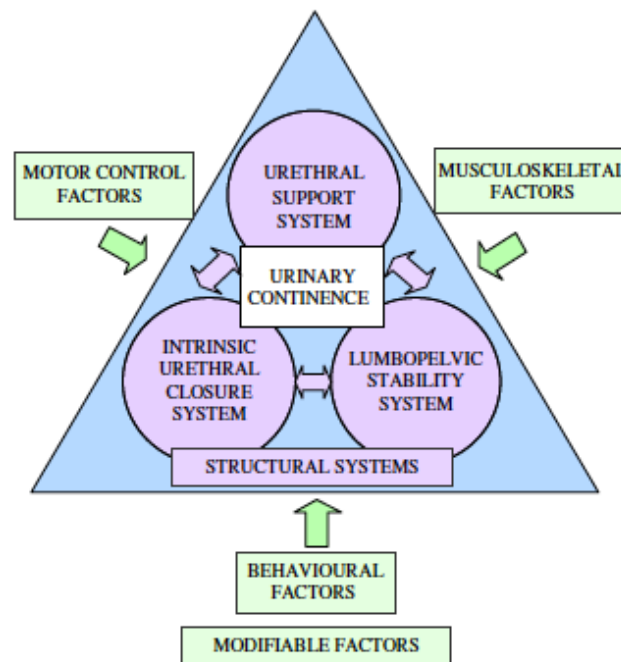


Fig. 1. The integrated continence system (Grewar and McLean, in press). Urinary continence is maintained through the interaction of three structural systems and three modifiable factors.

THE STRUCTURAL SYSTEMS

Structural urethral closure system

1. *Intrinsic urethral closure system*

- Urethra is a tube... with smooth and striated muscles essentially
- “The closure pressure of the urethra is further augmented by a well-developed sub mucosal vascular plexus; a watertight mucosal coaptation occurs when the arteriovenous anastomoses fills with blood, creating a hermetic seal. These vessels also have estrogen & progesterone receptors... suggesting a hormonal link.”

2. *Urethral support system*

- Includes endopelvic fascia, the anterior vaginal wall, the arcus tendineus fasciae pelvis & the levator ani muscles
- The pelvic floor structure is formed primarily by the levator ani muscles and the coccygeus muscles
- NOTE: the perineal branch of the pudendal nerve, arising from the sacral roots S2 – S4, provides somatic innervation to the levator ani muscle
- Contraction of the levator ani ‘lifts the pelvic floor’ and moves the bladder neck anteriorly, which favours closure of the urethra.

3. *Lumbopelvic stability system*

- Intact osseoligamentous factors (form closure)
- Muscle compression forces (force closure)
- Control by the nervous system

Control of the lumbar spine and pelvis is dependent on the local muscle system, consisting of the diaphragm, the transversus abdominus, the pelvic floor muscles, and the lumbar multifidus...

- The coordinated activity of these muscles influences postural control by regulating intra-abdominal pressure, and increasing the tension on the thoracolumbar fascia.

- The nervous system must be able to evaluate the requirements for lumbopelvic control, determine the current status of the lumbopelvic region, and develop strategies to meet those demands.

THE MODIFIABLE SYSTEMS

Modifiable factors represent external factors that can influence the overall function of the urinary continence system.

1. Motor control factors:
 - a. Pelvic floor muscle dysfunction
 - b. Postural & movement dysfunction
 - c. Low back and pelvic pain
 - d. Breathing disorders
2. Musculoskeletal factors
 - a. Decreased ROM
 - b. Decreased muscle strength
 - c. Decreased muscle endurance
3. Behavioural factors
 - a. Chronically elevated intra-abdominal pressure
 - b. Physical inactivity
 - c. Abnormal fluid intake & voiding patterns
 - d. Poor psychosocial health

PATHOPHYSIOLOGY OF stress urinary incontinence

Structural system deficits

1. *Urethral closure system deficits:*
 - a. Commonly associated with multiple anti-incontinence procedures, radical pelvic surgery or radiation, menopause, or urogenital atrophy.
2. *Urethral support system deficits:*
 - a. Direct damage to the pelvic floor muscles or the nerve supply to these muscles due to labour or vaginal delivery

- b. Stretching or tearing of the fascial supports for the urethra and the bladder can cause hypermobility of the urethra and bladder... which compromises the ability to close sphincters or create closure pressure to the urethra.
- c. Aging, estrogen deficiency and connective tissue abnormalities may also contribute to the decreased strength of the connective tissues of the pelvic floor muscles.

NOTE: when the fascia of the pelvic floor becomes over-distended, the perineum may descend over time and the pelvic floor muscles may lengthen and occupy a lower position in the pelvic cavity.

3. Lumbopelvic stability system deficits

- a. i.e. osteoarthritis, stenosis or joint instability... (no evidence exists for this yet... b/c it's not been studied). However:
 - i. asymmetric sacroiliac joint laxity is associated with post-partum pelvic pain
 - ii. diastasis rectus has been linked with pubic pain and myofascial pain in the abdomen and pelvic floor muscles
 - iii. Manual compression of the pelvis can eliminate the exaggerated descent of the bladder and pelvic floor muscles in patients with SIJ pain during a supine SLR.
- b. Therefore... stress urinary incontinence MAY be a consequence of failed load transfer through the lumbopelvic region.

Modifiable factor deficits

1. Motor control factors

- a. Pelvic floor muscle awareness and ability to perform a contraction... taking into account parameters other than strength, such as the RATE of force production & the ability to perform Repeated Fast Contractions.

- b. Delayed or absent pelvic floor muscle automatic activity... suggesting that the TIMING of the pelvic floor muscle contraction is key to preventing leakage episodes.
- c. Postural & movement dysfunction...
 - Evidence exists that alignment of the spine and pelvis may affect pelvic floor muscle and trunk muscle co-activation.
 - A neutral spine = (c/s lordosis, T/S kyphosis, L/S lordosis, & a neutral pelvis) is best for optimized recruitment of the deep trunk stabilizing muscles
- d. Low back & pelvic pain...
 - Reduced function of the diaphragm, abdominal muscles and pelvic floor muscles amongst individuals with incontinence & respiratory disease may compromise postural control and may contribute to the development of low back pain.
 - AND... increased activity of the superficial trunk muscles (as seen in pts with back pain) may restrict the expansion of the rib cage & abdomen.
- e. Breathing disorders...
 - Respiratory problems are commonly seen in patients with low back pain, pelvic floor dysfunction and poor posture.
 - Poor function of either the diaphragm or the pelvic floor muscles may alter their normal mechanism for regulating intra-abdominal pressure.
 - As well, COUGHING could increase the demand on the pelvic floor muscles.

2. Musculoskeletal factors

- a. Decreased ROM...
 - Articular, muscle or fascial restrictions in the lumbopelvic-hip region or thorax may contribute to the development of pain, compensatory movement patterns & maladaptive postures.

- Soft tissue scarring in the perineal area & abdominal cavity (from birthing)... may contribute to pain & limited mobility
- Scar tissues or adhesion... may affect the function, position & motility of the abdominal or pelvic viscera.

b. Decreased muscle strength

- Intensive pelvic floor muscle training is believed to cause hypertrophy and increased the stiffness of the pelvic floor muscles and the connective tissues to improve recruitment efficiency, to elevate the pelvic floor and to ultimately facilitate an automatic pelvic floor muscle contraction during rises of Intra-abdominal pressure.

c. Decreased muscle endurance

- Endurance of the pelvic floor muscles is significantly reduced in incontinent women as compared to continent ones.

3. Behavioural Factors

a. Chronically elevated intra-abdominal pressure

- Coughing, lifting, opera singing, aerobic exercise, & high impact activities
- Found in women that are overweight
 - (NOTE: weight loss has been shown to improve urinary incontinence in obese & overweight women)
- Cigarette smoking

b. Physical inactivity

- More incontinence in sedentary women as compared to those that engage in low-intensity activities for 1-hour or more per week.

- c. Abnormal fluid intake & voiding patterns
 - Excessive fluid intake may overload the bladder
 - Caffeine, carbonated beverages, alcohol, decaffeinated coffee or tea, citrus fruit, vinegar, & artificial sweeteners may contribute to the problem
 - Repetitive straining to defecate in those with constipation has been associated with damage of the innervation of the puborectalis muscle.
 - Accumulation of stool in the rectum may press on the bladder or alter the position of the pelvic organs.

- d. Poor psychosocial health
 - Anxiety, and social withdrawal (due to incontinence) may influence posture and motor control via the limbic system.
 - Link between social withdrawal, fitness, nutrition, smoking status & incontinence.

THERAPY & ADVISEMENT

Lifestyle & Behavioural Interventions

- Adjust fluid intake; a 25% decrease in the hours before sleep and/or encourage 1.5 Litres per day.
- Avoid bladder-irritating liquids (as listed above)
- Bladder retraining, with voiding every 3 – 4 hours
- Education re: dietary fibre & regular fluid intake
- Weight management
- Smoking cessation
- Psychosocial health... treatment occurs in a supportive & motivating environment, make attainable goals that minimize lifestyle changes, provide positive feedback at every visit, encourage participation in group classes.

Motor Control Interventions

- E-stim with biofeedback (inserts) to help contract the pelvic floor muscles and/or retrain them
- Real-time ultrasound or digital palpation in clinic during pelvic floor muscle contraction exercises to assess correctness of the contraction
- Teach owners digital palpation of the same.
- Teach FUNCTIONAL INTEGRATION of pelvic floor muscle contraction
- Train fast contractions
- Train voluntary contractions immediately prior to coughing, blowing nose, sneezing, laughing, etc.
- Train coordinated pelvic floor muscle and abdominal co-contraction during cough, and other activities a/a.
- Retrain neutral spine during posture & functional movements
- Restore form closure, force closure, & motor control in the lumbopelvic hip
- Train pelvic floor muscles with your lumbopelvic stabilization program
- Train diaphragmatic breathing patterns
- Teach strategies to reduce excessive global muscle activity
- Train tonic co-contractions of the local muscle system while breathing.

Musculoskeletal Interventions

- Restore normal articular, muscle, and fascial mobility in the lumbopelvic hip region
- Restore mobility of the SIJ and connective tissues in the pelvic floor
- Visceral manipulation
- E-stim biofeedback training
- Pelvic floor strength training
- Train repeated sustained tonic holds of the pelvic floor muscles to the point of fatigue

Pharmacological Treatment

Estrogen

- Known to act in the urethral mucosa, vasculature, muscle & periurethral connective tissue, consequently influencing the intra-urethral pressure required for continence
- Does not benefit premenopausal incontinent women (better with menopausal women). May be an adjunct to surgery or physical therapies
- Controversial & highly debated therapy

Epinephrine & serotonin reuptake inhibitors

- Increased urethral resistance pressure, maximum urethral closure pressure and thickness of the striated urethral sphincter
- Improvement in the frequency of leaks and the patients' quality of life
- Side effect: nausea

Anticholinergics

- (First choice in humans). Improvement of symptoms & quality of life
- Side effects, dry mouth & constipation

Beta3-adrenergic agonists

- These promote relaxation of the detrusor muscle and increase the bladder capacity without increasing the residual volume.
- Side effects: headache, urinary tract infections, urinary retention, hematuria, dry mouth, constipation, & fecal incontinence

Botulinum toxin

- Injected into the detrusor muscle. May improve the quality of life and reduction of urgency episode, urge incontinence, nocturia & urinary frequency

Surgical Treatment

- Retropubic colposuspension
- Slings

Urethral Bulking Agents

- Intended to reduce the urethral lumen with mucosal coaptation.
- 40% – 70% cure rate at 18 months follow-up
- Effects are temporary
- Side effects: infection, urinary retention, local pain, pseudo-abscess formation, urethral erosion

ADJUNCTIVE THERAPIES

Acupuncture

I found three studies. Each study used different points.

1. Yuan *et al.* 2014:
 - a. Spleen 6:
 - b. Spleen 9:
 - c. Kidney 3:
 - d. Conception Vessel 4:

2. Emmons & Otto 2005:
 - a. Bladder 39:
 - b. Bladder 28:
 - c. CV 4:

3. Jin *et al.* 2014
 - a. Bladder 32:
 - b. Bladder 35:
 - c. Spleen 6:
 - d. Stomach 36:

All studies found significant improvements in female urinary incontinence.

References:

1. Grewar H, McLean L. 2008, The integrated continence system: A manual therapy approach to the treatment of stress urinary incontinence. *Man Ther.* 13: 375-386.
2. Castro RA, Arruda RM, Bortolini AT. 2014, Female urinary incontinence: effective treatment strategies. *Climacteric.* 17: 1 – 7.
3. The Foundation for Medical Practice Education – www.fmpe.org
4. Yuan Z, He C, Yan S, et al. 2014, Acupuncture for the overactive bladder in female adult: a randomized controlled trial. *World J Urol.* Nov 16 [Epub ahead of print].
5. Emmons SL, Otto L. 2005, Acupuncture for the overactive bladder: a randomized controlled trial. *Obstet Gynecol* 106(1): 138 – 143.
6. Jin C, Zhou X, Pang R. 2014, Effect of electroacupuncture combined with tolterodine on treating female mixed urinary incontinence. *J Wound Ostomy Continenc Nurs* 41(3): 268 – 272.