The role of the pelvic floor muscle (PFM) in continence
- Clinical experience in decreasing urinary incontinence (UI) with PFM training (Kegel 1948)
- Original framework of modern theories incorporate the role of the support ligaments and the PFM (Wall and DeLancey 1991, DeLancey 1993)
- Multiple basic science studies have now contributed to a more clear understanding of the role of the PFM in urinary continence (mechanism summarized well in Ashton-Miller 2007)
- After many well done RCTs and systematic reviews – evidence of decreased symptoms after PFM exercises
  - Comparing PFM training to no treatment (Dumoulin 2011)
  - Women who were treated were 17 times more likely to report cure or improvement
  - Were 5 to 16 times more likely to be continent on pad test
- “It is no longer a question of whether PFM training programs work but what components and combinations thereof are most effective” (Dumoulin 2011)

Conservative examination of PFM function (Bo 2005)
- Real time Imaging Ultrasound
  - Valid and reliable measurements
  - Very expensive for most therapy clinics
  - Measures PFM muscle thickness
  - Measures movement of urethra in response to PFM contraction and intra-abdominal pressure
- Dynamometry
  - Some reliability tests
  - Not clinically available
  - Measures closure pressure
  - Does not measure elevation
- Surface electromyography (EMG)
  - Good reliability, reproducibility, and significant clinical predictive validity
  - Measures electrical activity of PFM with vaginal or perianal sensors
  - Useful in identifying dyssynergia and overactive PFM
- Pressure biofeedback
  - Valid and reproducible
  - Measures PFM closure pressure
- Vaginal palpation
Rationale for the effect of PFM Training in SUI

- Close the urethra during abrupt increases in intra-abdominal pressure with a well-timed, quick and strong PFM contraction – Knack (Bo 2007)
- Increase PFM volume and shorten PFM length (Hoff Brækken 2010)
- Maintain urethral hiatus closed (Ashton-Miller 2007, Hoff Brækken 2010)
- A strong structural support (stiff pelvic floor) may prevent descent of the bladder neck and urethra and helps maintain urethral closure (Ashton-Miller 2007, Bo 2007)
- Elevate the resting position of the bladder and rectum (Hoff Brækken 2010)

Components of PFM Training

- Number of seconds contraction is held – 5 to 10 seconds (Schabrun 2011, Bo 1999)
- Amount of rest between contractions – 5 to 10 seconds, adequate rest is necessary for successful training (Schabrun 2011)
- Number of repetitions – gradually increase, at least 24 contractions per day according to a meta-analysis (Choi 2007)
- Number of times repeated during the day – 2 to 3 sets per day especially if the muscle is very weak
- Patient position - Supine, sitting, standing
  - Randomized study comparing supine-only PFM exercises to supine and upright PFM exercises showed no significant difference in decreasing UI (Borello-France 2006)
- Overflow /facilitation – adductors, abductors, external rotators
  - Very weak muscles may need assistive exercises initially
  - Most practitioners will advance exercises to be performed in an isolated manner
  - Some clinical and small research evidence shows that overflow exercises can be as successful as isolated exercises (Dumoulin 2011, Culligan 2010)
- Intensity
  - Submaximal exercise can help isolate PFM contraction for better quality and coordination and can result in decreased UI (Johnson 2001)
  - Maximal intensity exercises are needed for full strengthening (Bo 1999)
- Resistive exercises
  - Some practitioners feel exercise done in upright (sitting or standing) provide gravity resistance and are more difficult
  - Vaginal weights – can result in decreased UI (Herbison 2008) but comparison studies do not show a significant advantage over PFM exercises alone (Bo 1999)
- Functional training
  - Functional training (during increased intra-abdominal pressure): 98% decrease in UI with moderate cough if “the knack” was taught (Miller 1998)
  - Bladder neck elevation occurred consistently only during PFM and Tranversus Abdominus contraction (Junginger 2010)
  - Teach PFM contraction during lifting and pushing
• Breathing
  o PFM contraction should be trained on the exhale for better trunk stability and bladder neck elevation during coughing and sneezing (Miller 1998)
  o Breathe during PFM endurance contraction as PFM activity can be maintained regardless of breathing phase (Hodges 2007)
  o Bearing causes downward movement of urethra and an inability to maintain PFM contraction / elevation (Junginger 2010)

• Frequency of visits - Supervised PFM training more than 2 times per month are more effective (Dumoulin 2011)

• Group versus intensive training
  o “Intensive PFM training” (individualized instruction with repeated visits) appears better than “group PFM training” (exercise class) (Hay-Smith 2004)
  o Individualized PFM training and bladder training vs. group exercises - improvement rates of 94% vs. 86% (Janssen 2005)
  o Significant decrease in UI in patients exercising in a group with a PT compared to those in home training. Based on individual teaching of correct PFM contraction and close supervision (Bo 1990)
  o Group compared to individual – participants undergoing individual training were dryer on pad test but otherwise both group had improvement in strength, quality of life and patient satisfaction (86% in both groups). Group PFM exercises is significantly better than no treatment. (Pereira 2011)

• Adherence
  o Upcoming results from the ICS Physiotherapy adherence subcommittee
  o Those using a routine approach to PFMT adherence and practicing bladder training where 12 x more likely to maintain adherence (Dumoulin 2011)
  o Those using audiotaped instructions were more likely to perform exercises 2x / day. (Dumoulin 2011)
  o Studies on long-term effects of PFM training found that adherence was a significant predictor of success both during the period of therapy and thereafter (Alewijnse 2007)

• Length of training period
  o First 6 to 8 weeks is neural adaptation, increased coordination; will see decrease in UI (Burns 1993; Dougherty 1993; Wyman 1998)
  o Muscle hypertrophy begins after regular and intense strength training for more than 8 weeks (Dinubile 1991)
  o Meta-analysis of PFM training shows program must last for at least 6 weeks (Choi 2007)

Maintenance
  o No standard agreement, may be individual for each patient
  o One set of 8-12 intense contractions 2 to 7 times per week (Pollock 1998, Hayn 2000)
References


Janssen CC, Lagro-Janssen AL, Felling AJ. The effects of physiotherapy for female urinary incontinence: individual compared with group treatment. BJU Int. 2001;87:201-6


