Successful, established and innovative concepts of pelvic floor rehabilitation

W24, 30 August 2011 09:00 - 12:00

Start	End	Topic	Speakers
09:00	09:05	Introduction	• Bary Berghmans
09:05	09:35	Scientific background for pelvic floor motor control, coordination training and specific stabilization of the pelvic floor –Results of a new therapy program	• Kaven Baessler
09:35	10:05	Specific PF rehabilitative programme Dynamic rehabilitative	• Baerbel Junginger
10:05	10:30	Abdominal hypopressive gymnastics on the pelvic floor as a treatment for SUI in women	• Maura Seleme
10:30	11:00	Break	None
11:00	11:30	Pelvic physiotherapeutic modalities for treatment of fecal incontinence in women	• Bary Berghmans
11:30	11:45	Pelvic floor muscle and abdominal hypopressive exercises for perception, reinforcement and relaxation of the pelvic floor	• Maura Seleme
11:45	12:00	Discussion	All

Aims of course/workshop

Pelvic floor rehabilitation, and namely pelvic physical therapy is considered to be one of the mainstays of management of pelvic floor dysfunctions. Our multidisciplinary international faculty will link innovative concepts to scientific evidence and to clinical practice towards implementation. This ICS workshop aims to inform health care providers, such as gynecologists, urologists, (colorectal) surgeons, physical therapists and nurses, about the current clinical and scientific state and development of pelvic floor rehabilitation of adult men and women with different kinds of urinary and/or fecal incontinence, and to demonstrate its clinical practice.

Educational Objectives

To assess and discuss the underlying concepts and principles of recent diagnostic and treatment modalities of pelvic physiotherapy, the base for their working mechanism. Furthermore, other objectives of this workshop is to provide insight in what kind of patients are most suitable for these treatment modalities, and what is the level of evidence for this kind of non-surgical treatment, how is this evidence linked and how is it implemented into clinical practice.

The results of a new pelvic floor rehabilitation programme with focus on motor control and pre-contraction will be presented. Influences of common physical activities in gymnastics and sports on the bladder neck position will be shown using perineal ultrasound imaging. Ultrasound will be presented as a new medium for physiotherapy and as a biofeedback instrument.

Scientific background of pelvic motor control, coordination training and specific stabilisation of the pelvic floor

Kaven Baessler, urogynaecologist, MD PhD, associate professor

Motor control and pelvic floor awareness are essential parts of pelvic floor rehabilitation. Physiological and patho-physiological findings in motor control of the trunk muscles have been studied extensively in people with and without lumbar back and pelvic pain (Hides, 1996; Hodges 1997; Hungerford, 2004). Morphologic changes have been identified in the multifidus muscle which is comparable with the pelvic floor muscles and its predominantly slow-twitch-fiber composition (Rantanen 1993 and Zhao 2000). Experimentally induced pain in the lumber spine leads to a loss in pre-programming of transversus abdominis muscle during functional manoeuvres (Hodges, 2003). This suggests that pain may be responsible for the initiation of the motor control dysfunction (Arendt-Nielsen, 1996). Emotional components and anticipation of pain (Moseley, 2004) can be responsible in back pain patients similar to the dysfunction previously induced by back pain and muscle recruitment changes (Ferreira, 2004) can result.
Increased activity of the superficial trunk muscles was found in chronic pain patients when they exercise back muscles (Flor, 1983). Delayed relaxation of back muscles (Radebold, 2000) and reduced activity during functional movements (Sihvonen, 1997) are further findings in the back population.
Tonic muscle activity (slow-twitch-fiber muscles), segmental stabilisation, pre- and cocontractions is the established basis in the rehabilitation of recurrent back pain and should be the basis for specific and selective, functional and physiological pelvic floor rehabilitation (O´Sullivan, 1997; Hides JA, 2001).
The pelvic floor muscle as a part of the abdominal capsule is a tonic muscle system with predominantly slow-twitch-fibres resulting in a different physiology and pathophysiology compared to superficial muscles.
To incorporate qualitative components into pelvic floor rehabilitation all muscles surrounding the abdominal capsule have to be observed. Motor control is most important before effective strength and endurance programmes can commence. Technique rather than strength, with other words muscle co-contraction or “teamwork” results in a more economic pelvic floor contraction and prevents fatigue of the dysfunctional muscles.
For the maintenance of continence, pelvic floor muscle contraction is required to stabilise the bladder neck (and to compress the distal urethra) during increased intra-abdominal pressure. While contraction of pelvic floor muscles leads to an elevation of the bladder neck, intraabdominal pressure raise may result in bladder neck descent (Thompson, 2006).
In a study on interaction of intra-abdominal pressure, muscle EMG activity and bladder neck position an excessive increase of intra-abdominal pressure was found during voluntary maximal contractions of the pelvic floor muscles (Junginger, 2007). During tasks like head lift or brace bladder neck elevation was only apparent when IAP and PF muscle activity were appropriately matched. Although the transverse abdominis muscle also increased the IAP, bladder neck elevation still occurred during its contraction with a co-contraction of PFM. As all muscles surrounding the abdominal cavity have been shown to have the potential to increase IAP, and increased IAP caused descent of the bladder neck, activation of the PFM is critical to maintain the position of the bladder neck during tasks that involve abdominal and diaphragm muscle contraction. If PF muscle activity is insufficient or abdominal muscle activity (and the associated increase in IAP) is increased, bladder neck descent may occur during functional tasks. Such descent of the bladder neck may be associated with urine loss. Therefore it seems paramount to eliminate gross abdominal muscle contractions and ensure a sufficient pelvic floor contraction.
Consideration of the coordination of the pelvic floor and abdominal muscles is likely to be important in the management of stress urinary incontinence.

Studies and their presentation at the IUGA Annual Meeting Taipei 2008:
Baessler et al. found that maximal pelvic floor muscle contractions are not necessary to elevate the bladder neck, submaximal contractions are sufficient to reach the elevation. Maximal contractions have the disadvantage of increasing the intra-abdominal pressure undesirably due to co-contractions of the abdominal muscles (Baessler et al. 2008). In a prospective study after performing a PFM rehabilitation program adopting the following principles: submaximal contractions, co-contraction with M. transversus abdominis and their

integration in daily life but without further regularly exercises, success rates were: 70% ceased (stress urinary incontinence), improved in 21%; 76% denied overactive bladder symptoms, improvements in 12%. Self-reported improvement rates were reported at 88% for mixed incontinence, 88% of pure stress urinary incontinence, 50% of faecal incontinence and 27% of flatus incontinence (Junginger et al, 2008),

References:

1. Hides JA, Richardson CA, Jull GA. Multifidus muscle recovery is not automatic after resolution of acute, first-episode low back pain. Spine. 1996 Dec 1;21(23):2763-9.
2. Hodges PW, Richardson CA. Contraction of the abdominal muscles associated with movement of the lower limb. Phys Ther. 1997 Feb;77(2):132-42; discussion 142-4.
3. Hungerford B, Gilleard W, Lee D. Altered patterns of pelvic bone motion determined in subjects with posterior pelvic pain using skin markers. Clin Biomech (Bristol, Avon). 2004 Jun;19(5):456-64.
4. Rantanen J, Hurme M, Falck B, Alaranta H, Nykvist F, Lehto M, Einola S, Kalimo H. The lumbar multifidus muscle five years after surgery for a lumbar intervertebral disc herniation. Spine. 1993 Apr;18(5):568-74.
5. Zhao WP, Kawaguchi Y, Matsui H, Kanamori M, Kimura T. Histochemistry and morphology of the multifidus muscle in lumbar disc herniation. Spine. 2000; 25(17): 2191-9.
6. Hodges PW, Moseley GL, Gabrielsson A, Gandevia SC. Experimental muscle pain changes feedforward postural responses of the trunk muscles. Exp Brain Res. 2003. 151: 262-71.
7. Arendt-Nielsen L, Graven-Nielsen T, Svarrer H, Svensson P. The influence of low back pain on muscle activity and coordination during gait: a clinical and experimental study. Pain. 1996 Feb;64(2):231-40.
8. Moseley GL, Nicholas MK, Hodges PW. Does anticipation of back pain predispose to back trouble. Brain 2004; 127: 2339-47
9. Ferreiera PH, Ferreira ML, Hodges PW. Changes in recruitment of the abdominal muscles in people with low back pain. Spine. 2004 29(21): 2560-6.
10. Flor H, Hoog G, Turk DC, et al. Efficacy of EMG biofeedback, pseudotherapy and conventional medical treatment for chronic rheumatic back pain. Pain. 1983. 17: 21-31.
11. Radebold A, Cholewicki J, Panjabi MM, et al. Muscle response pattern to sudden trunck loading in healthy individuals and in patients with chronic low back pain. Spine. 2000. 25: 947-54.
12. Sihvonen T, Lindgren KA, Airaksinen O, et al. Movement disturbances of the lumbar spine and abnormal back muscle electromyographic findings in recurrent low back pain. Spine. 1997. 22: 289-95.
13. O'Sullivan PB; Twomey LT; Allison GT. Evaluation of Specific Stabilizing Exercise in the treatment of Chronic Low Back Pain With Radiologic Diagnosis of Spondylolysis or Spondylolisthesis. Spine. 1997 22(24): 2959-67
14. Hides JA, Jull GA, Richardson CA. Long-term effects of specific stabilizing exercises for first-episode low back pain. Spine. 2001 Jun 1;26(11):E243-8.
15. Thompson JA, O'Sullivan PB, Briffa NK, Neumann P. Differences in muscle activation patterns during pelvic floor muscle contraction and Valsalva maneuver. Neurourol Urodyn. 2006;25(2):148-55.
16. Baessler K, Junginger B. Bladder neck elevation with different levels of effort of pelvic floor muscle contraction. Int Urogynecol J; 19 (Suppl 1): S71-72.
17. Junginger B, Kreiner E, Baessler K. 2008 Prospective follow – up investigation of a specific pelvic floor rehabilitation program with focus on coordination using a validated Pelvic Floor Questionnaire. Int Urogynecol J; 19 (Suppl 1): S8-9

Dynamic pelvic floor ultrasound: assessment of pelvic floor function and application as a biofeedback instrument

Bärbel Junginger, pelvic physiotherapist (PT), manual therapist

Perineal and abdominal ultrasound

Perineal or translabial ultrasound provides images of the bladder, urethra and anorectal junction. It is painless and non-invasive, easily applied supine and standing, easily learned, performed and taught; it is accepted and easily understood by women. Because of the lack of radiation, ultrasound permits prolonged imaging of pelvic floor function, especially when used as a biofeedback tool. Perineal ultrasound does not affect the topography of the bladder as long as there is no prolapse beyond the introitus and not too much pressure on the perineal probe as this can displace the bladder neck cranially [1] .

Abdominal ultrasound can give reasonable static and dynamic images of the filled bladder and also indirectly of a pelvic floor contraction by visualisation of the bladder base elevation [2]. It is limited in the investigation and visualisation of the pelvic floor, particularly of the urethra and bladder neck. There is no standardisation of the assessment although measurements of the bladder displacement during a pelvic floor contraction have been reported to be reproducible [2, 3]. Abdominal ultrasonography is the approach of choice for the non-invasive observation of the concomitant or primary action of the transversus and obliquus abdominis muscles [4].

Assessment of pelvic floor function

With perineal ultrasound, in a midline sagittal view the puborectalis muscle as a part of the pelvic floor is directly visible behind the anorectal junction as a hyperechoic structure. The position of the bladder neck is traditionally assessed as a surrogate parameter of pelvic floor muscle activity [5-9]. The dynamic evaluation of pelvic floor function includes position, elevation or descent of the bladder neck and puborectalis muscle at rest as well as pelvic floor precontraction, voluntary pelvic floor contraction at maximal strength and with submaximal effort, hold during breathing and coughing, stabilisation of the urethra, hold of bladder neck position during coughing or abdominal manoeuvres.

Bladder neck descent during straining or a Valsalva manoeuvre in young, nulliparous and continent women has been reported between 0 and 40 mm [10-13]. To distinguish between normal bladder neck mobility and bladder neck hypermobility, a cut-off value of 5 mm [12, 14] or 14 mm [15, 16] has been used. However, straining and Valsalva are different procedures. Per definition a Valsalva manoeuvre is a forced exspiratory effort against a closed glottis to increase intrapleural pressure resulting in bradycardia and hypotonia. It is an unphysiological test that might result in concomitant pelvic floor contraction instead of relaxation in some women [11]. With abdominal ultrasound, assessment of the co-contractions of the transverse, internal and external oblique muscles may also help preventing unwanted co-contractions that increase the intraabdominal pressure and may lead to bladder neck descent.

The aim is firstly to assess and diagnose function and dysfunction (assessment), secondly to explain the findings to the patient (increase awareness and knowledge - what is physiological, what are the problems), thirdly to teach / train / practice correct function (biofeedback) and finally to follow up and check adherence and progress not only regarding pelvic floor function but also the success regarding pelvic floor symptoms and quality of life (follow up). Only with the dysfunction established a specific and individual rehabiliation can be tailored. The ultrasound provides an excellent assessment, teaching and biofeedback tool for the patient as well as for the health care professional.

Biofeedback

Biofeedback via perineal ultrasound can enhance the understanding of normal pelvic floor function during coughing e.g. The physiological pre-contraction of the pelvic floor can be taught, known as the “Knack”, a pelvic floor contraction that is generated before coughing or sneezing to prevent urinary leakage [17, 18]. The Knack has been confirmed to improve the stability of the bladder neck during coughing. Straining and Valsalva are not exactly physiological activities but can be used as a substitute for activities that involve increased intraabdominal pressures like nose-blowing, defaecation, bending or playing a wind instrument. In conjunction with perineal ultrasound, abdominal ultrasound is a valuable instrument to assess the synergy of the pelvic floor and deep abdominal muscles. It can be used for pelvic floor re-education especially for retraining of functional tasks that result in urinary leakage in the individual subject [19].

Visual feedback via endoanal ultrasound has been studied in patients with faecal incontinence. However, biofeedback with endoanal ultrasound and anal manometry did not prove to be of additional benefit compared to digital feedback [20]. Dynamic or “realtime” ultrasound has been used successfully as a biofeedback method in the rehabilitation of the multifidus muscle [21]. In this randomised controlled trial subjects who were instructed to perform an isometric contraction of the multifidus muscle supported by ultrasound imaging maintained their improvements over one week compared to the subjects who did not receive visual biodfeedback.

Clinical application

During this talk typical cases will be presented to describe pelvic floor assessment, diagnosis, instructions, treatment and success. This includes women with no automatic pre-contraction or inability to hold a pelvic floor contraction during breathing in and women with only a “flicker” – pelvic floor contraction at the beginning. The effect of submaximal and maximal pelvic floor contractions on the bladder neck will be shown (a maximal contraction is not needed to sufficiently elevate the bladder neck, Baessler et al., Poster presentation, IUGA).

References

1 Schaer GN, Koechli OR, Schuessler B, Haller U. (1996) Perineal ultrasound: determination of reliable examination procedures. Ultrasound Obstet Gynecol 7: 347-52

2 Thompson JA, O'Sullivan PB. (2003) Levator plate movement during voluntary pelvic floor muscle contraction in subjects with incontinence and prolapse: a cross-sectional study and review. Int Urogynecol J Pelvic Floor Dysfunct 14: 84-8

3 Bo K, Sherburn M, Allen T. (2003) Transabdominal ultrasound measurement of pelvic floor muscle activity when activated directly or via a transversus abdominis muscle contraction. Neurourol Urodyn 22: 582-8

4 Sapsford RR, Hodges PW. (2001) Contraction of the pelvic floor muscles during abdominal maneuvers. Arch Phys Med Rehabil 82: 1081-8

5 King JK, Freeman RM. (1998) Is antenatal bladder neck mobility a risk factor for postpartum stress incontinence? Br J Obstet Gynaecol 105: 1300-7

6 Peschers U, Schaer G, Anthuber C, Delancey JO, Schuessler B. (1996) Changes in vesical neck mobility following vaginal delivery. Obstet Gynecol 88: 1001-6

7 Peschers UM, Fanger G, Schaer GN, Vodusek DB, DeLancey JO, Schuessler B. (2001) Bladder neck mobility in continent nulliparous women. BJOG 108: 320-4

8 Dietz HP. (2004) Ultrasound imaging of the pelvic floor. Part I: two-dimensional aspects. Ultrasound Obstet Gynecol 23: 80-92

9 Dietz HP, Clarke B, Herbison P. (2002) Bladder neck mobility and urethral closure pressure as predictors of genuine stress incontinence. Int Urogynecol J Pelvic Floor Dysfunct 13: 289-93

10 Brandt FT, Albuquerque CD, Lorenzato FR, Amaral FJ. (2000) Perineal assessment of urethrovesical junction mobility in young continent females. Int Urogynecol J Pelvic Floor Dysfunct 11: 18-22

11 Peschers UM, Vodusek DB, Fanger G, Schaer GN, DeLancey JO, Schuessler B. (2001) Pelvic muscle activity in nulliparous volunteers. Neurourol Urodyn 20: 269-75

12 Reed H, Freeman RM, Waterfield A, Adekanmi O. (2004) Prevalence of bladder neck mobility in asymptomatic non-pregnant nulliparous volunteers. BJOG 111: 172-5

13 Dietz HP, Eldridge A, Grace M, Clarke B. (2004) Pelvic organ descent in young nulligravid women. Am J Obstet Gynecol 191: 95-9

14 Reilly ET, Freeman RM, Waterfield MR, Waterfield AE, Steggles P, Pedlar F. (2002) Prevention of postpartum stress incontinence in primigravidae with increased bladder neck mobility: a randomised controlled trial of antenatal pelvic floor exercises. BJOG 109: 68-76

15 Lin LY, Chen SY, Lee HS, Chung SL, Ying TH, Chen GD. (1999) Female bladder neck changes with position. Int Urogynecol J Pelvic Floor Dysfunct 10: 277-82

16 Meyer S, De Grandi P, Schreyer A, Caccia G. (1996) The assessment of bladder neck position and mobility in continent nullipara, mulitpara, forceps-delivered and incontinent women using perineal ultrasound: a future office procedure? Int Urogynecol J Pelvic Floor Dysfunct 7: 138-46

17 Miller JM, Perucchini D, Carchidi LT, DeLancey JO, Ashton Miller J. (2001) Pelvic floor muscle contraction during a cough and decreased vesical neck mobility. Obstet Gynecol 97: 255-60

18 Peschers UM, Gingelmaier A, Jundt K, Leib B, Dimpfl T. (2001) Evaluation of pelvic floor muscle strength using four different techniques. Int Urogynecol J Pelvic Floor Dysfunct 12: 27-30
19 Sapsford R. (2004) Rehabilitation of pelvic floor muscles utilizing trunk stabilization. Man Ther 9: 3-12
20 Solomon MJ, Pager CK, Rex J, Roberts R, Manning J. (2003) Randomized, controlled trial of biofeedback with anal manometry, transanal ultrasound, or pelvic floor retraining with digital guidance alone in the treatment of mild to moderate fecal incontinence. Dis Colon Rectum 46: 703-10
21 Van K, Hides JA, Richardson CA. (2006) The use of real-time ultrasound imaging for biofeedback of lumbar multifidus muscle contraction in healthy subjects. J Orthop Sports Phys Ther 36: 920-925

Effects of abdominal hypopressive gymnastics on the pelvic floor as a treatment for SUI in women

Maura Seleme, PhD, pelvic PT

Hypopressive gymnastics are systemic techniques that through accessory respiratory musculature stimuli relax the diaphragm, diminish the abdominal pressure and reflexively tone up the abdominal and pelvic floor musculature (Caufriez,1989). In other words, hypopressive techniques are diaphragmatique aspiration techniques, reflex neuro-facilitation techniques and hypopressive gymnastique exercises. All these techniques generate a negative intra-abdominal pressure, stimulating an unconscious reflex contraction of the perineal musculature and abdominal parietal. The first hypopressive techniques named diaphragmatic inspiration were created in 1980 by Marcel Caufriez. In 1991 in pregnant women using manometry he studied the influence of changes of intra-abdominal pressure in the pelvis minor as a result of postural changes on the pelvic floor (Caufriez,1997). The first aim of the technique was abdominal tonification in order to prevent pelvic floor dysfunctions in post partum women. Caufriez tried to demonstrate that in pregnant women, because of weakness of the abdominal muscles, the intra-abdominal pressure was directed to the frontal part of the pelvic floor, stimulating opening of the vagina, descent of pelvic organs and urinary incontinence. The use of hypopressive techniques would stimulate the opposite, i.e., direction of the intra-abdominal pressure to the dorsal part of the pelvic floor, improving strength of abdominal and (deep) pelvic floor muscles reflexively and stimulating closing of the vagina and mechanical support of the pelvic organs (Caufriez, 1989; Bourcier,1989 ; Walllach et Ostergard 2001;Towers,2004;Shafik1997).

Hypopressive techniques consist of holding different static positions during a diaphragmatical inspiration, each between 30 seconds and 1 minute, repeated during 10 minutes, 2x/day for minimal 3 months. In pregnant women, in this kind of positions during inspiration between 20 and 30 mm Hg less intra-abdominal pressure can be measured manometrically and a upward movement of the pelvic organs can be realised with a reflex contraction of the pelvic floor muscles. The intensity of this reflex contraction depends on the duration and the number of repetitions of the hypopressive phase and not on the degree of hypo pressure (Caufriez,1991).

Hypopressive techniques might be very useful for those women that are unable to contract their pelvic floor muscles consciously.

To demonstrate hypopressive techniques and the working mechanism of this kind of unconscious involuntary contraction of the pelvic floor, a movie will be shown, produced at the Escola Superior de Tecnologia da Saúde de Lisboa, Lisboa, Portugal, in which a nulliparous woman without urinary loss but with a hypertonic pelvic floor, will perform a diaphragmatic inspiration without perineal contraction. Using a Phenix biofeedback device, with registration of signals through a vaginal probe and sensors at the abdominal level, a maintained contraction of the pelvic floor and abdominal musculature during the whole diaphragmatic inspiration phase can be observed. This demonstration is not meant to prove that this technique is superior to a voluntary contraction of the pelvic floor, but tries to show that a reflex contraction through diaphragmatic contraction really occurs and that this technique might be useful to stimulate pelvic floor contractions, especially in women that cannot perform a conscious contraction. (Seleme et al, 2008).

A second movie was made at the same institution with the intention to show a reflex pelvic floor contraction, utilizing a device called “educator” inserted into the vagina. Diaphragmatic inpiration leads to a inclination of the educator stem downwards, demonstrating simultaneous contraction and elevation of the pelvic floor muscles (Seleme et al, 2008).

In the third movie a diaphragmatic aspiration in a woman with vaginal prolapse is shown with complete relapse through diaphragmatic aspiration technique.

Although hypopressive techniques might be promising, reviewing relevant literature, not a single effect study could be identified. Despite the fact that hypopressive gymnastics are claimed as a technique to rehabilitate the pelvic floor, up to now scientific evidence is lacking that this technique might work in women with stress urinary incontinence. Related to the concepts of hypopressive techniques, several recent studies have been performed investigating the role of abdominal manometric enclosure (Guilharme1992; Valancogne 2001; Fatton 2001) and globality of the static and dynamic of lomb (Sapsford,2004; Comeford et Mottran,2001; Chia Hsin Chen,2005; Fozzatti,2008; Bertotto 2008). During this presentation these concepts and relevant literature will be reviewed and discussed.

Recently, a randomized study was performed by Costa & Bertotto (2008). The aim of this study was to investigate the effects of 10 sessions of hypopressive exercises on (functionality of) the pelvic floor in women between 40 and 65 years of age with stress urinary incontinence. During the workshop data of this study will be presented.

References

Caufriez M. Thérapies manuelles et instrumentales em uroginecologie. Volume 2. Maïté Editions. Bruxelles, 1989
Caufriez M. Gymnastique abdominale hypopressive. M.C. Ed. Bruxelles, 1997
Bourcier A. Le plancher Pelvien : explorations foncionnelles et réadaptations: Ed. Vigot, Paris,1989
Wallach S. Ostergard D. Anatomia Pélvica feminina. In: D´Ancona C.A.L; Rodrigues Netto Junior N. Aplicações clínicas da urodinâmica;3° ed, Ed.Atheneu, São Paulo,2001
Towers GD.The pathophysiology of pelvic organ prolapse. J. Pelvic Med, Surg.,2004
Shafik A. Et al. Direct measurement of intrabdominal pressure in various conditions. Eur J Surg 1997;163:883-
Seleme M. Dabbadie L.; Ramos I. Filme de demonstração da contração involuntária perineal através do educador. Laboratório da Escola Superior de Tecnologia da Saúde de Lisboa, 2008
Seleme M. Dabbadie L.; Ramos I. Filme de demonstração da contração involuntária perineal através do biofeedback por eletromiografia. Laboratório da Escola Superior de Tecnologia da Saúde de Lisboa, 2008
Guilharme I. Intérêts d´une rééducation abdominale spécifique dans le dysfonctionnements abdomino-pelvines et perinéux secondaire à la grossesse et à la chirurgie abdominale. Mémoire D.U. Université J. Monnet, St Etienne, 1992
Valancogne, G. et al. Rééducation perineologique et pressions dans l'enceinte manometrique abdominale. J. Pluridisciplinaire de Pelvi-Périnéologie. 25-35, mars 2001.
Fatton B. Poussée abdominale et prolapsus ou perinée descendent. XXIV congrès de la societé internacionale,2001
Sapsford R. Rehabilitation of pelvic floor musclus utilizing trunk stabilization manual therapy,2004
Comeford M.J; Mottran S.I. Movement of stability dysfunction contemporary developments manual therapy, 2001
Chia-Hsin Chen et all. Relationship between ankle position and pelvic floor muscle activity in female stress urinary incontinence. J.Urology, 2005
Fozzatti M.C.M; Palma P; Herrmann V; Dambros M. Impact of global postural education for treatment of female stress urinary incontinence. Rev. Assoc. Med. Bras. 54(1):17-22, jan.-fev. 2008
Bertotto A, Costa T, Rodrigues B. Avaliação do assoalho pélvico em mulheres adultas submetidas à técnica abdominal hipopressiva [Trabalho de Conclusão de Curso]. Canoas: Centro Universitário La Salle,2008
Bertotto A, Costa T, Rodrigues B. Treinamento dos músculos perineais versus técnica abdominal hipopressiva: tratamento preventivo e conservador das disfunções do assoalho pélvico avaliados através do biofeedback eletromiográfico [Trabalho de Conclusão do Curso]. Canoas: Centro Universitário La Salle,2008

Pelvic physiotherapeutic modalities for treatment of fecal incontinence in women
Bary Berghmans, PhD MSc pelvic PT

Fecal incontinence
Pelvic physiotherapeutic modalities in fecal incontinence (FI) include biofeedback (BF) (including rectal balloon training (RBT)) and electrical stimulation (ES) and is offered by (pelvic) physiotherapists. Often, one or more physiotherapeutic treatments are combined, depending on the underlying cause of FI.

Biofeedback and rectal balloon training
Biofeedback is a technique, which monitors biological signals and electrically amplifies these to provide feedback to the patient. Biofeedback intends to control physiological processes, normally being under involuntary control.
Biofeedback is originally described as an operant conditioning therapy [Engel 1974]. Positive confirmation will encourage the performed response, in contrary to negative confirmation. Engel et al. [1974] applied operant conditioning of rectosphincteric responses in the treatment of FI. Originally, the aim was to counteract internal sphincter relaxation due to rectal distension by forceful contraction of the external anal sphincter with minimal sensory delay. Nowadays, three modalities of biofeedback in the treatment of FI can be recognized [Norton 2004].
1. An intra-anal electromyographic (EMG) sensor, an anal manometric probe (measuring intra-anal pressure change), or perianal surface EMG electrode is used to inform the patient about the activity of the pelvic floor muscles by way of a visual display and/or an auditory signal. The patient attempts to aim the response to the ideal response. Goal of this treatment modality is to create awareness of the squeezing musculature during strength training without rectal distension. In addition, the correct muscle response and progress of the patient can be demonstrated. Training can focus on endurance force (submaximal contraction sustained for prolonged time) or increase of squeeze amplitude (peak force). The exercises are based on pelvic floor and external anal sphincter exercises.
2. The second modality involves the use of a manometric rectal balloon (rectal balloon training). The rectal balloon is filled with air to imitate rectal contents. The patient with an elevated sensory threshold is trained to discriminate to smaller rectal volumes, resulting in an earlier warning from stool entering the rectum and earlier external sphincter response to counteract reflex inhibition of the internal sphincter [Miner 1990]. However, progressive distension of the rectal balloon is used in patients with a hypersensitive rectum to resist urge feelings.
3. The third modality is a 3-balloon system (a balloon-tipped water perfused catheter or a Schuster-type three-balloon probe) used to train a forceful external anal sphincter contraction after a stimulus of rectal distension [Heymen 2001]. In this way, external sphincter contraction counteracts relaxation of the internal anal sphincter due to rectal distension. This treatment is originally that described by Engel et al [1974]. Some authors feel that sensory delay is an important factor in FI [Miner 1990].
Overall, biofeedback gives feedback about the possibility, degree and quality of contracting and relaxing the pelvic floor, and gives feedback on the coordination between rectal distension and contracting anal closing system [MacLeod 1983], but it is still unclear whether or not biofeedback has an additional effect compared to pelvic floor muscle exercises without biofeedback [Hosker 2000]. Patients most likely to benefit from biofeedback include those who have motivation, intact cognitive skills, some rectal sensation, and nearly intact sphincters and innervation [Jorge 1993, Heymen 2000, Loening-Baucke 1990]. It is reported that patients with neurological deficits (diabetes, spina bifida, multiple sclerosis) are less likely to be treated successfully [Heymen 2000]. Even though continence is achieved after physiotherapeutic treatment, the rectosphincteric reflexes sometimes remain abnormal, implicating that the external sphincter response to rectal distension is an unreliable predictor of treatment outcome[Norton 2005].

Cerulli was the first to use biofeedback by way of insertion of three balloons: one intra-rectal (to allow rectal distension) and two intra-anal (to record internal and external sphincter contractions separately) [Cerulli 1979].
Success rates of BF therapy in FI are generally based on numerous uncontrolled trials. There are over 60 uncontrolled trial reports in the literature on the use of BF for the management of FI [Norton 2006a]. Some authors conclude that BF is the treatment of choice for FI on the basis of these observational studies [Enck 1993] and controlled clinical trials [Guillemot 1995, Enck 1994]. An overall cure and improvement rate of 72% has been reported [Norton 2001]. However, the results of a Cochrane review on the effects of BF and/or PFMT for the treatment of FI in adults were based on only eleven

randomized controlled trials and showed that some elements of BF therapy and sphincter exercises might have a therapeutic effect, but this is not certain [Norton 2006a].
Moreover, it was suggested that rectal balloon training (RBT) improved continence more than sham training. This is in agreement with other authors who consider lowering the threshold volume for discrimination of rectal distension an important factor in the success of BF [Chiarioni 2002].
In an attempt to assess the effect of the different BF components (balloon/pressure BF, electromyographic BF) in the management of FI, two complicated cross-over trials have been performed [Miner 1990]. Group comparisons were impossible to assess due to the small sample in one trial and the single case experiments in the other.

Electrical stimulation

The purpose of electrical stimulation is to re-educate weakened and poorly functioning pelvic floor muscles by means of increasing awareness and isolated contraction of the stimulated structures [Hosker 2000]. ES is often used as an adjunct to pelvic floor muscle exercises and biofeedback therapy, to assist with identification and isolation of pelvic floor muscles and to create an artificial contraction if a voluntary contraction of the pelvic floor is not possible .
In electrical stimulation, the number of motor units recruited is dependent on a number of factors. These include the parameters of the electrical stimulus, impedance (resistance to the flow of the current) and the size and orientation of the electrodes. The electrodes should be placed as close as possible to the pelvic floor muscles. The electrical stimulus should be stimulating enough to depolarize the nerve, whereas uncomfortable sensations should be avoided [Laycock 1994]
The precise mechanisms by which electrical stimulation can restore fecal control are not well understood: in case of optimizing the gracilis neosphincter, a transformation of fast-twitch muscle fibers to less-fatigable slow-twitch muscle fibers is hypothesized, including increases in capillary density. Some studies have shown an increase in axonal budding following denervation [Laycock 1994]. Changes in muscle fiber diameter may be important as well. Besides physiological and metabolic changes, enhanced awareness of the anal sphincter is reported to be essential [Laycock 1994]. A possible working mechanism of neuromodulation through efferent or afferent nerve stimulation needs to be further investigated. Contra-indications for ES are anal infections, rectal bleeding, complete denervation of the pelvic floor (will not respond), swollen/painful hemorrhoids, deficient sensation, atrophy of mucosa, six week period after surgery, pacemaker, dementia, pregnancy and pain during palpation [www.seekwellness.com/incontinence/electric_stim.htm]. At present there are too little data to determine the exact working mechanism of electrical stimulation in the treatment of fecal incontinence [Norton 2005].

A Cochrane review evaluated ES in adult patients with FI [Hosker 2000]. Insufficient data was available to allow reliable conclusions on the effect of ES in the management of FI [Hosker 2000]. A recently published randomized controlled trial examined whether anal ES, using an anal probe electrode, in the absence of any adjunctive exercises or advice, would improve symptoms of FI and anal sphincter pressures when compared with “sham” ES. Patients rated that their bowel control had improved to a modest extent. However, there was no statistically significant difference detected between the groups, suggesting that 1 Hz was as effective as 35 Hz. This raises the possibility that the main effect is not sphincter contraction but sensitization of the patient to the anal area, or simply the effect of intervening per se [Norton 2006b]. This result is in agreement with Mahony et al. [Mahony 2004] who concluded that the addition of ES did not enhance symptomatic outcome, and Suhr et al. concluded that ES is inferior to pressure BF [Surh 1998]. In contrary, Sprakel et al. found ES to be effective in the conservative treatment of anorectal incontinence [Sprakel 1998].
Finally, the results of a recent large cohort study on ES and PFMT with BF in patients with severe FI indicated that pelvic floor muscle rehabilitation leads overall to a modest improvement in severity of FI, squeeze pressure and maximal tolerated volume [Terra 2006].

References

Engel BT, Nikoomanesh P, Schuster MM: Operant conditioning of rectosphincteric responses in the treatment of fecal incontinence. *N Engl J Med* 1974, 290:646-649.
Norton C: Behavorial management of fecal incontinence in adults. *Gastroenterology* 2004, 126:S64 S70.
Miner PB, Donnelly TC, Read NW: Investigation of mode of action of biofeedback in treatment of fecal incontinence. *Dig Dis Sci* 1990, 35(10):1291-1298.
Heymen S, Jones KR, Ringel Y, Scarlett Y, Whitehead WE: Biofeedback treatment of fecal

incontinence: a critical review. *Dis Colon Rectum* 2001, 44(5):728-736.
MacLeod JH: Biofeedback in the management of partial anal incontinence. *Dis Colon Rectum* 1983, 26(4):244-246.
Hosker G, Norton C, Brazzelli M: Electrical stimulation for faecal incontinence in adults. *Cochrane Database Syst Rev* 2000(2):CD001310.
Jorge JM, Wexner SD: Etiology and management of fecal incontinence. *Dis Colon Rectum* 1993, 36(1):77-97.
Loening-Baucke V: Efficacy of biofeedback training in improving faecal incontinence and anorectal physiologic function. *Gut* 1990, 31(12):1395-1402.
Norton et al. Conservative and pharmacological management of faecal incontinence. In:
Abrams P, Cardozo L, Khoury S, Wein A, editors. Incontinence. Paris 2005: Health Publication 1547-1555
Cerulli MA, Nikoomanesh P, Schuster MM: Progress in biofeedback conditioning for fecal incontinence. *Gastroenterology* 1979, 76(4):742-746.
Norton C, Cody JD, Hosker G: Biofeedback and/or sphincter exercises for the treatment of faecal incontinence in adults. *Cochrane Database Syst Rev* 2006a, 3:CD002111.
Enck P: Biofeedback training in disordered defecation. A critical review. *Dig Dis Sci* 1993, 38(11):1953-1960.
Guillemot F, Bouche B, Gower-Rousseau C, Chartier M, Wolschies E, Lamblin MD, Harbonnier E, Cortot A: Biofeedback for the treatment of fecal incontinence. Long-term clinical results. *Dis Colon Rectum* 1995, 38(4):393-397.
Enck P, Daublin G, Lubke HJ, Strohmeyer G: Long-term efficacy of biofeedback training for fecal incontinence. *Dis Colon Rectum* 1994, 37(10):997-1001.
Norton C, Kamm MA: Anal sphincter biofeedback and pelvic floor exercises for faecal incontinence in adults--a systematic review. *Aliment Pharmacol Ther* 2001, 15(8):1147-1154.
Chiarioni G, Bassotti G, Stanganini S, Vantini I, Whitehead WE: Sensory retraining is key to biofeedback therapy for formed stool fecal incontinence. *Am J Gastroenterol* 2002, 97(1):109-117.
Miner PB, Donnelly TC, Read NW: Investigation of mode of action of biofeedback in treatment of fecal incontinence. *Dig Dis Sci* 1990, 35(10):1291-1298.
Laycock J, Plevnik S, Senn E: Electrical stimulation. In: *Pelvic Floor Re-education: Principles and practice.* Edited by Schüssler B. London: Springer-Verlag; 1994: 143-153.
Understanding electrical stimulation for incontinence [www.seekwellness.com/incontinence/electric_stim.htm]
Norton C, Gibbs A, Kamm MA: Randomized, controlled trial of anal electrical stimulation for fecal incontinence. *Dis Colon Rectum* 2006b, 49(2):190-196.
Mahony RT, Malone PA, Nalty J, Behan M, O'Connell P R, O'Herlihy C: Randomized clinical trial of intra-anal electromyographic biofeedback physiotherapy with intra-anal electromyographic biofeedback augmented with electrical stimulation of the anal sphincter in the early treatment of postpartum fecal incontinence. *Am J Obstet Gynecol* 2004, 191(3):885-890.
Surh S, Kienle P, Stern J, Herfarth C: Passive electrostimulation therapy of the anal sphincter is inferior to active biofeedback training (article in german). *Langenbecks Arch Chir Suppl Kongressbd* 1998, 115(976-8).
Sprakel B, Maurer S, Langer M, Diller R, Spiegel HU, Winde G: [Value of electrotherapy within the scope of conservative treatment of anorectal incontinence]. *Zentralbl Chir* 1998, 123(3):224 229.
Terra MP, Dobben AC, Berghmans B, Deutekom M, Baeten CG, Janssen LW, Boeckxstaens GE, Engel AF, Felt-Bersma RJ, Slors JF *et al*: Electrical stimulation and pelvic floor muscle training with biofeedback in patients with fecal incontinence: a cohort study of 281 patients. *Dis Colon Rectum* 2006, 49(8):1149-1159.