W21: The Overactive Pelvic Floor

Workshop Chair: Anna Padoa, Israel
29 August 2018 10:30 - 12:00

Start	End	Topic	Speakers
10:30	10:55	Pathophysiology of OPF	Linda McLean
10:55	11:15	Overactive pelvic floor and sexual function	Anna Padoa
11:15	11:35	Evaluating and understanding pelvic floor muscle overactivity- A physiotherapist perspective.	Melanie Morin
11:35	12:00	Evaluation and Treatment of the OPF from a Bio-psycho-social Perspective	Carolyn Vandyken

Aims of Workshop

Overactivity of the pelvic floor is often unrecognised and not well understood. Written resources on the subject are very limited and much of the management of the Overactive Pelvic Floor (OPF) is based on clinical experience.
This workshop is intended to serve as a valuable resource for clinicians with an interest in the pelvic floor. In addition, the workshop will provide clinical tools for medical and mental health practitioners alike for recognition, assessment, treatment and interdisciplinary referral of patients with OPF and OPF-related conditions. This workshop will serve as an occasion for caregivers to refine OPF patient management as well as stimulate investigative efforts.

Learning Objectives

1. To understand the definition, pathophysiology and clinical presentation of an overactive pelvic floor (OPF) and its relation to chronic pain conditions and psychosocial issues.
2. To carry out the evaluation of patients with OPF using a multidisciplinary approach and to become acquainted with common diagnostic techniques and tools.
3. To plan an individually tailored treatment strategy for patients suffering from OPF and OPF-related conditions.

Learning Outcomes

1. Improved awareness on the connection between chronic pelvic pain and symptoms related to pelvic floor overactivity.
2. Acquisition of a psychosocial approach in evaluation and treatment of OPF patients.
3. Awareness of the need to establish an interdisciplinary network of practitioners in the care of OPF patients.

Target Audience

Urologists, urogynaecologists, gastroenterologists, physiotherapists, Ob&Gyn, gastroenterologists, colo-proctologists, continence nurses, midwives, sex therapists and sexologists

Advanced/Basic

Advanced

Conditions for Learning

This workshop will be delivered as an interactive seminar.

Suggested Learning before Workshop Attendance

"The Overactive Pelvic Floor", Editors: Padoa, Anna, Rosenbaum, Talli. Springer, 2016
http://www.springer.com/gp/book/9783319221496

Suggested Reading

Gentilcore-Saulnier, E., Auchincloss, C., **McLean, L**. (2016). Chapter 15: Electromyography. **Anna Padoa** and Talli Rosenbaum. The Overactive Pelvic Floor. 1: 175-204.

Gentilcore-Saulnier E, **McLean L**, Goldfinger C, Pukall CF, Chamberlain S. Pelvic Floor Muscle Assessment Outcomes in Women With and Without Provoked Vestibulodynia and the Impact of a Physical Therapy Program. J Sex Med 2010;7:1003–22. doi:10.1111/j.1743-6109.2009.01642.x.

Goldfinger, C., Pukall, C. F., Thibault-Gagnon, S., **McLean, L.,** Chamberlain, S.,. (2016). Effectiveness of non-medical/non-surgical treatments for provoked vestibulodynia: A randomized study. Journal of Sexual Medicine. 13(1): 88-94.

Holstege, H. How the emotional motor system controls the pelvic organs. Sex Med Rev 2016;4:303 e3282016.

Huynh HK, Willemsen ATM, Lovick TA, Holstege G. Pontine Control of Ejaculation and Female Orgasm. J Sex Med 2013;10:3038–48. doi:10.1111/jsm.12300.

McLean, L., Brooks, K. (2017). What does electromyography tell us about dyspareunia?. Sexual Medicine Reviews. 5(3): 282-294.

Pukall, C., Strigo, I, Binik, Y. et al., Neural correlates of painful genital touch in women with vulvar vestibulitis syndrome, Pain. 2005. 115(1-2) 118-127. DOI: 10.1016/j.pain.2005.02.020.

Thibault-Gagnon, S., **McLean, L**., Goldfinger, C., Pukall, C., Chamberlain, S. (2016). Differences in the biometry of the levator hiatus between women with and without provoked vestibulodynia assessed using transperineal ultrasound imaging. Journal of Sexual Medicine. 13(2): 243-252.

Laan, E. van Lunsen, RHW (2016). Chapter 2: Overactive Pelvic Floor: Female Sexual Functioning. **Anna Padoa** and Talli Rosenbaum. The Overactive Pelvic Floor. pages 17-29.

Goldstein AT, Pukall CF, Brown C, Bergeron S, Stein A, Kellogg-Spadt S. Vulvodynia: Assessment and Treatment. J Sex Med. 2016 Apr;13(4):572-90. doi:10.1016/j.jsxm.2016.01.020. Epub 2016 Mar 25. Review. PubMed PMID: 27045258.

Reissing ED, Binik YM, Khalife S., Cohen D, Amsel R (2003). Etiological correlates of vaginismus: sexual and physical abuse, sexual knowledge, sexual self-schema and relationship adjustment. Journal of Sexual and Marital Therapy, 29: 47-59.

Morin, M., S. Bergeron, S. Khalife, M. H. Mayrand and Y. M. Binik (2014). "Morphometry of the pelvic floor muscles in women with and without provoked vestibulodynia using 4D ultrasound." J Sex Med 11(3): 776-785.

Morin, M., Y. M. Binik, D. Bourbonnais, S. Khalife, S. Ouellet and S. Bergeron (2017). "Heightened Pelvic Floor Muscle Tone and Altered Contractility in Women With Provoked Vestibulodynia." J Sex Med 14(4): 592-600.

Thibault-Gagnon, S. and **M. Morin** (2015). "Active and Passive Components of Pelvic Floor Muscle Tone in Women with Provoked Vestibulodynia: A Perspective Based on a Review of the Literature." J Sex Med 12(11): 2178-2189.

Chisari C. Chilcot J. The experience of pain severity and pain interverence in vulvodynia patients : The role of cognitive-behavioural factors, psychological distress and fatigue. *J Psychosom Res.* 2017 Feb;93:83-89. doi: 10.1016/j.jpsychores.2016.12.010. Epub 2016 Dec 23.

Vandyken C., Hilton S (2017). Physical Therapy in the Treatment of Central Pain Mechanisms for Female Sexual Pain. *Sexual Medicine Reviews,* 5(1), 20-13. Doi: 10.1016/j.sxmr.2016.06.004

<u>The Pathophysiology of the overactive pelvic floor</u>
Linda McLean, Canada

Despite a dearth of empirical data, pelvic floor muscle (PFM) overactivity is thought to play a crucial role in the development and/or maintenance of several conditions including genital and pelvic pain syndromes, sexual dysfunction, and bowel and bladder elimination disorders. When one considers the many physiological processes that interact to mediate PFM tone and excitability, it is not surprising that our understanding of the aetiology and pathophysiology of these conditions is limited.

Through this first presentation of the workshop, I will define PFM overactivity, highlighting the differences between tone and overactivity, two common terms used to describe PFM involvement in genital and pelvic pain, bowel and bladder elimination disorders and sexual dysfunction. An appropriate and consistent use of terminology is essential if we are to develop a common, shared understanding of these disorders. I will then review neuromuscular physiology as it pertains to excitatory and inhibitory influences on muscle activation, and will use this foundation to discuss the many excitatory and inhibitory pathways that influence PFM tone, voluntary activation, reflex activation, and behavioural and learned responses.

Having developed a common framework for understanding the physiology of PFM overactivity, I will discuss evidence for the involvement of PFM overactivity in dyspareunia and bowel and bladder elimination disorders. This discussion will include the current evidence for enhanced excitability to the PFMs and potential associations with alterations in peripheral and central pain processing. I will also discuss evidence for the potential influence of visceral somatization and emotional state on PFM overactivity.

The sum of the evidence provided will shed light on why concurrent consideration of biomedical and psychosocial factors is essential for the assessment and subsequent management of conditions associated with an overactive pelvic floor. The evidence presented will show how we might moderate PFM overactivity through physical interventions targeting behavioural and reflex pathways, but will also show that we must intervene on a psychosocial level to address the influence of thoughts and emotions on excitatory and inhibitory pathways influencing PFM excitability.

Take home message

A thorough understanding of PFM physiology, including the many excitatory and inhibitory influences associated with PFM activation, is crucial if we are to understand the overactive pelvic floor. Only through such a depth of understanding can we begin to optimize our outcomes through targeting appropriate biophysical and psychosocial pathways.

The overactive pelvic floor and sexual function
Anna Padoa, Israel

A well operating pelvic floor is an essential component of bowel, bladder, and sexual function.
Overactivity of the pelvic floor is less recognized and not as well understood as pelvic floor weakness and its clinical presentation is far more complex. Pelvic floor overactivity may be associated with musculoskeletal and neurological impairments, chronic pain conditions, anorectal and urinary dysfunction as well as psychological distress, and is correlated with symptoms that greatly affect quality of life as well as sexual function.

This presentation will start with an overview of the role of pelvic floor muscles in normal female sexual function. The evidence on the effect of pelvic floor muscle training on sexual function in women with normal pelvic floor muscle tone will be addressed. We will review the classification, pathophysiology, clinical presentation and treatment of female genito-pelvic pain and penetration disorders, with special emphasis on the relation between sexual pain, sexual arousal and pelvic floor muscle function.

The role of the pelvic floor in male sexual function will be mentioned, in relation to chronic pelvic pain and chronic prostatitis. Sexual arousal in women with sexual pain disorders will be addressed and relevant literature on this topic will be overviewed. We will then discuss pelvic floor overactivity in relation to several sexual, emotional and relationship issues. A special emphasis will be devoted to post traumatic stress disorder in sexual abuse survivors, as a cause for pelvic floor overactivity. Attachment styles and other behavioural issues in relation to the pelvic floor will also be mentioned.

In the section regarding treatment of overactive pelvic floor, we will focus on medical and surgical options for genito-pelvic pain disorders. We will present the evidence regarding efficacy of each treatment modality and suggest a rationale, based on the current literature, for individual treatment tailoring. We will overview the current evidence on the efficacy of treatment modalities such as topical creams, neuromodulating agents, botulinum toxin, muscle relaxants and surgery.

To conclude, the importance of a multidisciplinary treatment approach, including physiotherapy and psychosocial support, will be mentioned.

Take-home message

pelvic floor overactivity is often accompanied by impaired sexual function and genito-pelvic pain disorders. The importance of a multidisciplinary, individualized treatment approach, including psychosocial support and therapy, cannot be overemphasized in this group of patients.

Evaluating and understanding pelvic floor muscle overactivity- A physiotherapist perspective
Mélanie Morin, Canada

It has been recognized that pelvic floor muscle (PFM) overactivity plays a crucial role in several conditions such as bladder and bowel elimination disorders, genital/pelvic pain syndromes and sexual dysfunctions.

This presentation will review the muscle physiology associated with PFM tone. General muscle tone can be defined as the resistance provided by the muscle when pressure or a stretch is applied. General muscle tone in normally innervated skeletal muscles is composed of a passive and an active component (Simons, 2008). The passive component consists of the viscoelastic properties of the muscle tissue (Gajdosik 2001). The active component consists of physiological contracture (commonly defined as trigger point (TP)), electrogenic spasms (unintentional muscle contraction that can be brought to voluntary control), and normal electrogenic contraction (resting activity in normally relaxed muscle and myotatic reflex during stretching).

The presentation will also discuss the current assessment tools (palpation, ultrasound, manometry, electromyography (EMG) and dynamometry) and relate these tools to muscle physiology for evaluating muscle tone. Moreover, their psychometric properties (validity and reliability) and current recommendations will be presented.

The available evidence in women and men with conditions related to an overactive PFM will be discussed. So far, the literature suggests an elevated global PFM tone (measured by ultrasound, dynamometry and manometry), TPs (measured by palpation and palpometer), increased viscoelastic properties (dynamometer and EMG) and for some patients, elevated tone explained by electrogenic causes (evaluated by EMG). Empirical findings also indicate that the assessment of PFMs should not be limited to tone since the contractile properties (strength, speed of contraction, control and endurance) were also shown to be altered.

The evidence concerning the efficacy of PFM physiotherapy modalities will be presented. Physiotherapy intervention may include different modalities (education, manual therapy, biofeedback, electrical stimulation and dilator) which may target different components of PFM tone. For instance, biofeedback specifically addresses electrogenic spasms. The patients can thus learn how to properly relax their PFMs and gain control. In contrast, muscle stretching may address reduced flexibility associated with the viscoelastic properties of the tissue.

Take home message

A thorough understanding of PFM assessment tools in relation to muscle physiology is crucial to guide in the selection of treatment modalities and hence, potentiate efficacy.

This presentation will provide an overview of the physiology underlying elevated pelvic floor muscle tone in perspective with currently available tools. Moreover, empirical evidence available related to the implication of the PFMs in men and women with an overactive pelvic floor will also be presented.

Evaluation and Treatment of the OPF from a Bio-psycho-social Perspective
Carolyn Vandyken, Canada

Persistent pelvic pain is characterized by pain affecting bladder/bowel elimination disorders, genital/pelvic pain syndromes and sexual dysfunctions. Biopsychosocial models have revealed the importance of illness perceptions, cognitive-behavioural variables and psychological distress in explaining the experience of pain and disability across many pelvic pain conditions. Growing research in the area of pelvic pain over the past decade has emphasized the importance of taking a broad biopsychosocial approach to the management of pelvic pain. (1)

Physiotherapists have traditionally been trained in a more biomedical model; however, utilizing a broader, biopsychosocial model is essential in the treatment of these complex pain conditions. In order to do this, physiotherapists need to increase their competency in assessing distress using objective assessment tools such as the Depression, Anxiety, and Stress Scale (DASS-21), Pain Catastrophizing Scale (PCS), Tampa Scale of Kinesiophobia (TSK), the Positive Affect, Negative Affect Scale (PANAS), the FreMantle Back Questionnaire (FreBAQ) and the Central Sensitivity Inventory (CSI). (2)

Utilization of these tools will allow for appropriate treatment planning based on the unique presentation of each patient. Central pain mechanisms are a key component that needs to be assessed in every patient with pelvic pain; however, looking for specific drivers of this upregulated state is an important factor to effectively addressing the underlying components for each individual patient. (2)

Upon identification of the specific distress factors that may be contributing to the central pain mechanisms in the individual patient, physiotherapists need also develop specific competencies for modality-based interventions that fit well into the scope of practice for physiotherapy. Developing a modality based approach to pain education, yoga, qi gong/tai chi, sensori-motor exercises, relaxation exercises, and meditation will increase physiotherapist's competency in addressing the central pain mechanisms at play.

This presentation will focus on reviewing the key questionnaires needed to inform a physiotherapist's practice when using a biopsychosocial approach. Key competencies will also be addressed to build a toolkit for sensori-motor exercises focused on retraining the nervous system to address over activity in the pelvic floor muscles.

Take home message

With persistent pelvic pain, it is essential that physiotherapists focus on developing competency in assessing psychosocial distress. Using their newly found assessment skills, physiotherapists need also develop competency in the utilization of modalities based on yoga practices, tai chi/qi gong practices, pain education, meditation practices and exercises targeting the sensori-motor cortex.

ICS 2018 PHILADELPHIA

uOttawa

The Pathophysiology of the Overactive Pelvic Floor

Linda McLean, PhD
Professor, Faculty of Health Sciences,
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Ottawa, Canada

Labo MFM Lab

Linda McLean

Affiliations to disclose†:

No affiliations to disclose

† All financial ties (over the last year) that you may have with any business organization with respect to the subjects mentioned during your presentation

Funding for speaker to attend:

- [ ] Self-funded
- [X] Institution (non-industry) funded
- [ ] Sponsored by:

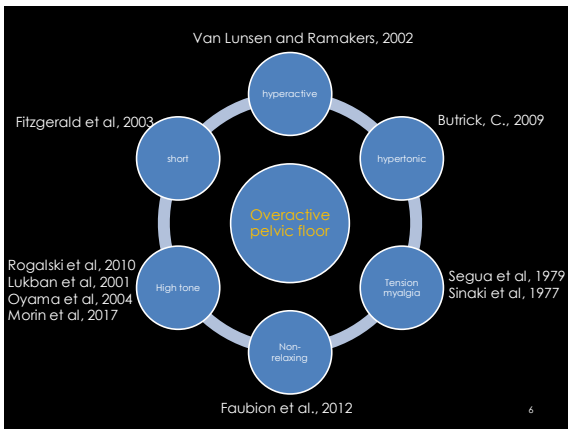
still
We ^ don't know.

Outline: The pathophysiology of OPF

1. The overactive pelvic floor - definitions
2. What factors influence pelvic floor muscle excitation/inhibition?
3. What research evidence supports pelvic floor overactivity?
4. How might central sensitization impact pelvic floor activity?
5. Summary

1. Definition?

The overactive pelvic floor



IUGA/ICS joint report

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DOI: 10.1002/nau.23518

REVIEW ARTICLE

WILEY

An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for the assessment of sexual health of women with pelvic floor dysfunction

Rebecca G. Rogers MD[1] | Rachel N. Pauls MD[2] | Ranee Thakar MD[3] | Melanie Morin PhD[4] | Annette Kuhn MD[5] | Eckhard Petri Dd, PhD[6] | Brigitte Fatton MD[7] | Kristene Whitmore MD[8] | Sheryl Kinsberg PhD[9] | Joseph Lee MBChB, FRANZCOG[10]

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"Pelvic floor muscles which do not relax, or may even contract when relaxation is functionally needed, for example, during micturition or defecation."

Rogers et al., 2018

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ICS report

Neurourology and Urodynamics 24:374–382 (2005)

Standardization of Terminology of Pelvic Floor Muscle Function and Dysfunction: Report From the Pelvic Floor Clinical Assessment Group of the International Continence Society

Bert Messelink,[1]* Thomas Benson,[2] Bary Berghmans,[3] Kari Bø,[4] Jacques Corcos,[5] Clare Fowler,[6] Jo Laycock,[7] Peter Huat-Chye Lim,[8] Rik van Lunsen,[9] Guus Lycklama à Nijeholt,[10] John Pemberton,[11] Alex Wang,[12] Alain Watier,[13] and Philip Van Kerrebroeck[14]

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Overactive pelvic floor muscles. A situation in which the pelvic floor muscles do not relax, or may even contract when relaxation is functionally needed for example during micturition or defecation. This condition is based on symptoms such as voiding problems, obstructed defecation, or dyspareunia and on signs like the absence of voluntary pelvic floor muscle relaxation.

Messelink et al., 2005

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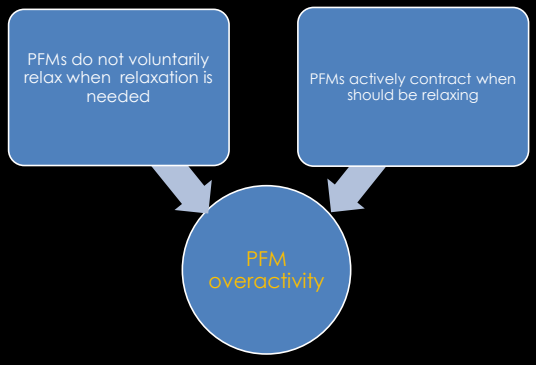

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Associated concepts

Hypertonicity

"[increased] Resistance of a muscle to passive lengthening" (Simons and Mense, 1998)

A general increase in muscle tone that can be associated with either elevated contractile activity and/or passive stiffness in the muscle. As the cause is often unknown, the terms of neurogenic hypertonicity and non-neurogenic hypertonicity are recommended.

Spasm

- "the presence of contracted, painful muscles on palpation and elevated resting pressures by vaginal manometry"
- "This persistent contraction of striated muscle cannot be released voluntarily. If the contraction is painful, this is usually described as a cramp".

Rogers et al. 2018

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Working definition of the overactive pelvic floor:

"pelvic floor muscle activation that is present when it is not required for function, and where poorly controlled tonic or phasic activation, caused by behavioural, reflex, or other involuntary mechanisms cause pain or impede bowel, bladder, sexual or other functions"

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2. So What factors influence PFM excitation?

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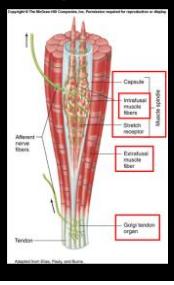
What influences PMF activation?

Local stretch receptors



Cutaneous receptors

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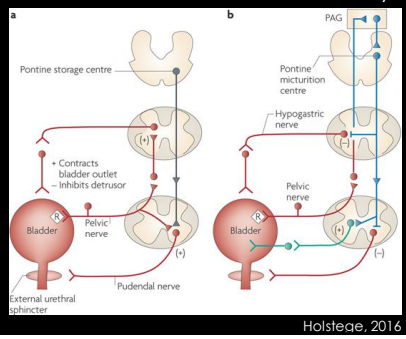
What influences PFM activation?

Spinal cord, cortex and brainstem relays



Holstege, 2016

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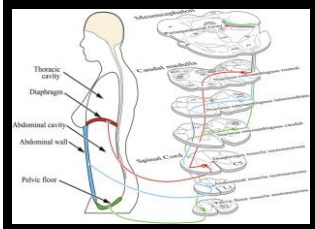
What influences PFM activation?

? Emotion



Holstege, 2016.

The emotional motor system represents diffuse pathways originating in the caudal brainstem and terminating on spinal grey matter, which may impact the tone or excitability of the PFMs under different physiological conditions

Because of the location of relay centers in the pons, with inputs from the cerebral cortex and the viscera, there is much subconscious control of PFM excitation and inhibition, and this control may be influenced by anxiety, pressure, and/or pain

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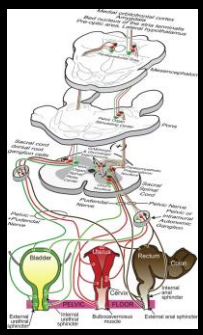
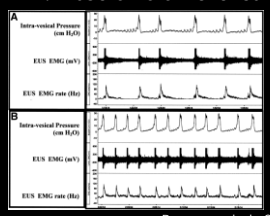
What influences PFM activation?



Holstege, 2016.

? Visceromotor Reflexes



Pezzone et al., 2005

Links between the intestinal tract, the lower urinary tract and the PFMs- fibers run in close proximity within the spinal cord and PONS

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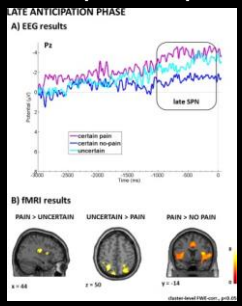
What influences PFM activation?

? Anticipation of pain



Seidel et al., 2014

The anticipation of pain may be sufficient to induce EMG activation in other muscles and it seems logical to suggest that, women with dyspareunia may contract their PFMs as a means of withdrawing from a potentially painful stimulus

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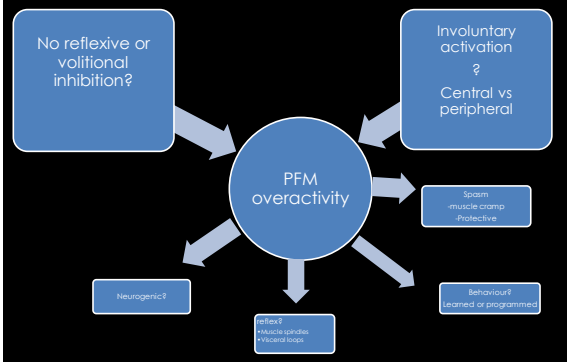

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3. What is the research evidence for OPF

- Must consider the different aspects of activation tonic, voluntary (phasic), reflex, motor control
- Must consider confounding influences of anxiety/fear, pain and pain history, emotional and visceromotor influences, MTrPs, and nervous system changes to pain processing

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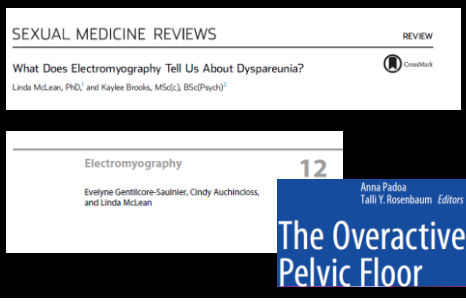
EMG is the only direct measure of muscle activation, **however EMG is not useful for clinical assessment in terms of diagnosis, prognosis nor progression**



Evidence for OPF through EMG

Eg. Vulvodynia (McLean and Brooks, 2017)

Type of activation	Superficial PFMs	Deep PFMs
Tonic	Higher in women with vaginismus and PVD than controls. Sample sizes small, however findings are consistent (Gentilcore-Saulnier et al, 2010, Engman et al., 2004; Shafik and El-Sibai, 2002; Gammoudi, 2016 etc).	Possibly higher in women with vaginismus. Early suggestions by Glazer et al. (1998) and White et al. (1997) that tonic EMG activation is higher in women with vulvodynia yet more recent evidence suggests no difference between women with PVD compared to controls eg. (Engman et al., 2004; Gentilcore-Saulnier et al., 2010.).

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Type of activation	Superficial PFMs	Deep PFMs
Maximum voluntary activation	Not reported	Postulated to be reduced yet no difference between women with and without dyspareunia in cohort studies using EMG. Morin et al. 2017 found lower force generating capacity, lower speed of contraction. Could this be pain inhibition?
Amplitude Variance	Not reported	Some studies have suggested impairment (Glazer et al., 1997, White et al., 1998) yet no difference between women with and without dyspareunia have been found in other cohort studies (eg. Engman et al.,2004) .
Endurance	Not reported	Impaired endurance has been suggested in women with PVD (Glazer et al., 1998, Morin et al., 2017) however again no concurrent EMG/maximum makes this result difficult to interpret.

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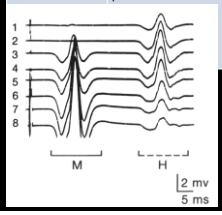
Type of activation	Superficial PFMs	Deep PFMs
Evoked/Reflex activation	Polysynaptic reflex amplitudes higher in women with vulvodynia than controls when evoked through clitoral stimulation (Frasson et al., 2009) May be higher in women with PVD when evoked through pressure at the vulvar vestibule or with vaginal probe insertion (Gentilcore-Saulnier et al., 2010).	Not higher in women with PVD compared to controls when stimulus is pressure at the vulvar vestibule (Gentilcore-Saulnier et al, 2010)



Higher activation during dynamometer opening (stretch) in women with PVD compared to controls (Morin et al, 2017)?

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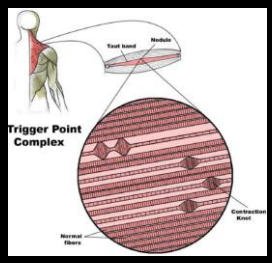
What about Myofascial trigger points (MTrPs)?



No sensitive nor specific diagnostic test for MTrPs
No proven relationship between myofascial pain syndrome and the presence of MTrPs .

MTrPs are commonly found in asymptomatic individuals, and some nodules are not tender to palpation at all (Travell and Simons, 1983; Shah et al., 2015; Mense et al., 2001)

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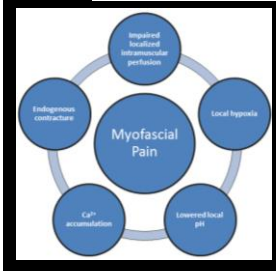
Narrative Review

Myofascial Trigger Points Then and Now: A Historical and Scientific Perspective

Jay P. Shah, MD, Nikki Thaker, BS, Juliana Heimur, BA, Jacqueline V. Aredo, BS, Siddhartha Sikdar, PhD, Lynn Gerber, MD



Are MTrPs associated with overactivity?

Probably not

Shah, 2015 27

4. Sensitization??


NIH Public Access
Author Manuscript
Pain. Author manuscript; available in PMC 2012 March 1.

Published in final edited form as:
Pain. 2011 March ; 152(3 Suppl): S2–15. doi:10.1016/j.pain.2010.09.030.

Central sensitization: Implications for the diagnosis and treatment of pain

Clifford J Woolf
Program in Neurobiology and FM Kirby Neurobiology Center, Children's Hospital Boston, and Department of Neurobiology, Harvard Medical School, Boston, Ma

NIH-PA Author Manusc

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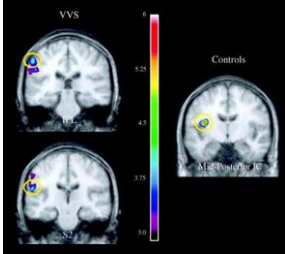
Evidence of cortical changes in women with provoked vestibulodynia?



Peripheral and/or Central sensitization?
- Allodynia
- hyperalgesia

Pukall et al., 2005

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Original Research

Association of Chronic Pelvic Pain and Endometriosis With Signs of Sensitization and Myofascial Pain

Pamela Stratton, MD, Izabella Khachikyan, MD, Nivet Sinaii, PhD, Robin Ortiz, BS, and Jay Shah, MD

Table 2. Sensitization and Myofascial Trigger Points in Women With Chronic Pelvic Pain With or Without a Current Diagnosis of Biopsy-Proven Endometriosis and in Healthy Volunteers

Physiatric Neuro-musculoskeletal Assessment	Pain and Current Biopsy-Proven Endometriosis (n=18)	Pain Only (No Biopsy-Proven Endometriosis) (n=11)	Healthy Volunteers (n=20)	*P*
Sensitization	15 (83)	9 (82)	3 (15)	<.001
Regional allodynia	14 (78)	9 (82)	3 (15)	<.001
Regional hyperalgesia	14 (78)	7 (64)	1 (5)	<.001
Lowered pressure pain threshold of supraspinous ligament	9 (50)	5 (45)	1 (5)	.003
Myofascial trigger points	17 (94)	10 (91)	3 (15)	<.001
Lowered pressure pain threshold of muscles	4 (22)	1 (9)	0	.026
Pain in past month (VAS score higher than 4)	16 (89)	7 (64)	0	<.001

VAS, visual analog scale.
Data are n (%) unless otherwise specified.
P values are from tests for trend comparing chronic pelvic pain and current biopsy-proven endometriosis with chronic pelvic pain only (without current biopsy-proven endometriosis) and with healthy volunteers. Pain and current biopsy-proven endometriosis comprises women diagnosed with endometriosis at laparoscopy in this study.

30

Remodeling our nervous system?

- Painful myofascial trigger points can sensitize segmentally related visceral structures creating the perception of endometrial pain, irrespective of the presence of lesions
- Long-term remodeling of the central nervous system (resulting in allodynia, hyperalgesia, and myofascial dysfunction) may persist after lesions are treated in women with a history of endometriosis.

Srbely J., Vadasz B., Shah J., Gerber N.L., Sikdar S., Kumbhare D. Clinical Journal of Pain. 32 (11) (pp 1011-1013), 2016.

Systematic review shows that available treatments for Vaginismus are efficacious, allowing the completion of sexual intercourse in 78% of cases. The duration of Vaginismus, but not the kind of intervention, seems to play as a factor modulating the success of therapy.

Maseroli, E. Scavello, G et al. outcome of Medical and Psychosexual inerventions for vaginismus: a systematic review And meta-analysis. Journal of Sexual Medicine 15(6) 2018

31

Fear avoidance?

Fear-avoidance and Pelvic Floor Muscle Function are Associated With Pain Intensity in Women With Vulvodynia

Justine Benoit-Piau, MPT, Sophie Bergeron, PhD,† Audrey Brassard, PhD,‡ Chantale Dumoulin, PT, PhD,§ Samir Khalifé, MD,‖ Guy Waddell, MD,¶ and Mélanie Morin, PT, PhD**

- Fear-avoidance, PFM variables, and partner support explained 28.3% of the variance in pain during intercourse ($P<0.001$).
- Among women with high partner support, catastrophizing was not significantly related to pain ($b=0.150$, $P=0.142$). When partner support was low, catastrophizing was significantly related to pain ($b=0.068$, $P<0.001$).

32

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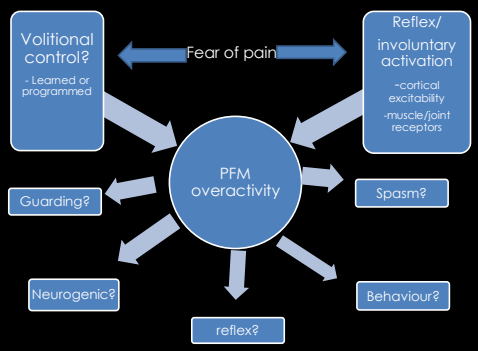

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Summary

OPF defined as "pelvic floor muscle activation that is present when it is not required for function, and where poorly controlled tonic or phasic activation, caused by behavioural or involuntary mechanisms, impedes function and affects bowel, bladder and/or sexual health"

has a multifactorial aetiology and pathophysiology.

Strategies to mitigate the impact of OPF on function should aim to target the physiological processes that underlie dysfunctional activation. These processes may differ from one patient to the next and may include but are not limited to disorders of pelvic floor muscle tone, spasm, motor control, relays from emotional and visceral pathways, and processing associated with peripheral and central nervous system remodeling.

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So what do we do?

36

Overactivity may be caused by:

- Neurologic conditions
- Problems with Motor control
- protective physiological reflexes
- Visceral/autonomic connections
- Emotion/fear

It is likely perpetuated by:

- Learned/anticipatory behaviours
- Central nervous system changes in response to longstanding pain

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9

Chemical mediators?

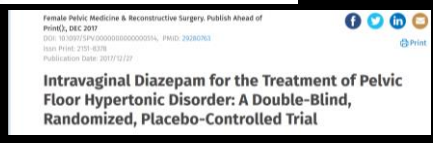
Don't appear to work in conditions associated with dyspareunia

Int Urogynecol J (2013) 24:1915–1923
DOI 10.1007/s00192-013-2108-9

ORIGINAL ARTICLE

Intra-vaginal diazepam for high-tone pelvic floor dysfunction: a randomized placebo-controlled trial

Catrina C. Crisp · Christine M. Vaccaro · M. Victoria Estanol · Susan H. Oakley · Steven D. Kleeman · Angela N. Fellner · Rachel N. Pauls



Female Pelvic Medicine & Reconstructive Surgery. Publish Ahead of Print(), DEC 2017

Intravaginal Diazepam for the Treatment of Pelvic Floor Hypertonic Disorder: A Double-Blind, Randomized, Placebo-Controlled Trial

40

But do seem to work in dyssynergic voiding

WILEY

Review article: dyssynergic defaecation and biofeedback therapy in the pathophysiology and management of functional constipation

The prevalence of dyssynergic defaecation in patients investigated for chronic constipation is as many as 40%. Randomised controlled trials have demonstrated major symptom improvement in 70%-80% of patients undergoing biofeedback therapy for chronic constipation resistant to standard medical therapy and have determined it to be superior to polyethylene glycol laxatives, **diazepam** or sham therapy. Long-term studies have shown 55%-82% of patients maintain symptom improvement.

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The Overactive Pelvic Floor and Female Sexual Dysfunction

Anna Padoa, MD
Urogynecology and Pelvic Floor Service
Yitzhak Shamir (Formerly Assaf Harofe) Medical Center
Sackler School of Mecine, Tel Aviv University

Anna Padoa, MD

Affiliations to disclose†:

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† All financial ties (over the last year) that you may have with any business organization with respect to the subjects mentioned during your presentation

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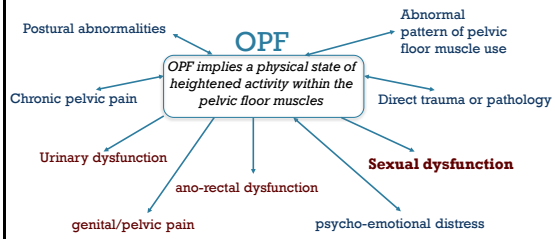
Definition of "overactive pelvic floor muscles"

- 2005 report from the Pelvic Floor Clinical Assessment Group of the ICS:

"A condition in which the pelvic floor muscles do not relax, or may even contract when relaxation is functionally needed, for example during micturition or defecation".

Messelink et al, Neurourol Urodyn. 2005;24(4):374-80.

OPF symptom complex



What is the role of pelvic floor muscles in normal female sexual function?

- Kegel, 1948:
  - a technique for strengthening the striated pelvic floor musculature as a treatment for urinary stress incontinence. Several women reported enhanced erotic sensations in their genitals and a greater ability to experience orgasm.
- Pubococcygeal muscle strength was found to be higher in orgasmic than anorgasmic women.
- It was hypothesized that at the time of intercourse, sexual pleasure is enhanced by the contractions of the pubococcygeous and iliococcygeus muscles

Kegel AH. Am J Obstet Gynecol 1948;56:238–48.
Graber G, Kline-Graber G. J Clin Psychiatry 1979;40:348–51.

The Pelvic Floor and Female Sexual Function

- Masters and Johnson,1966: voluntary and involuntary pelvic floor contractions occur during sexual arousal in both genders.
- Involuntary and rhythmic contractions of the pelvic floor muscles seen during orgasm, with 0.8-second intervals.
- The intensity of the pelvic floor contractions during arousal and orgasm appeared to decrease with age.

Masters WH, Johnson VE. Human sexual response. Boston: Little Brown; 1966.

The Pelvic Floor and Female Sexual Function

- Bohlen and colleagues observed three different patterns of orgasmic contractions in eleven women aged 24-33.
  - First type: a small number of regular contractions subjectively indicated orgasm onset
  - Second type: twice as many regular contractions followed by additional irregular contractions.
  - Third type: a small number of women reported experiencing orgasm without any pelvic floor contractions.

Bohlen JG et al. Arch Sex Behav 1982;11:367–86.

The Pelvic Floor and Female Sexual Function

Sherfey, 1974 - Myovascular theory:

Venous congestion and stretching of the pelvic muscles stimulate muscle nerve endings so that they begin to contract. These muscular contractions, perceived as pleasurable, constitute the experience of orgasm.

Sherfey MJ. J Sex Marital Ther 1974;1:97-109.

Role of PFM in sexual function

- The bulbocavernosus muscle was found active during sexual activity, suggested function was to hold the penis in place while providing penile stimulation during heterosexual sex.
- Reflex contractions of the levator ani and puborectalis muscles have been found on stimulation of the clitoris and cervix.
- It has been suggested that they enhance biological reproductive function by providing:
  - distal vaginal distention
  - elongation of the vagina
  - proximal vaginal ballooning, facilitating entry of the penis
  - moving the cervix more cranially and providing a receptacle near the cervix to hold semen and thus facilitate conception

Shafik A. Eur J Obstet Gynecol Reprod Biol 1995;60:161-164.
Shafik A. Int J Gynecol Obstet 1995;51:61-62.
Shafik A, et al. J Reprod Med 2008;53:111-6
Shafik A. Int Urogynecol J 1995;6:329-336.
Shafik A. J Sex Res 1996;33:153-157.

Are stronger PFM associated with better sexual function?

YES, IT DOES		NO, IT DOESN'T	
Messe MR, Geer JH. Arch Sex Behav 1985;14:13-28.	Vaginal contractions without additional stimulation enhanced both genital and subjective sexual arousal	Chambless DL et al. J Consult Clin Psychol 1984;52:114–8	**Coitally orgasmic women in less than 30% of intercourse events, PFMT increased pubococcygeus strength with no improvement on coital orgasmic frequency**
Graber B, Kline-Graber G. J Clin Psychiatry 1979; 40(8):348–351	A decrease in pubococcygeus strength demonstrated in anorgasmic women compared with orgasmic women	Roughan PA et al. J Sex Marital Ther 1981;7:223-9.	46 women with orgasm difficulties practicing PFMT over a 12-week period vs. relaxation vs. attention control group: no difference in orgasmic outcome
Lowenstein et al, Int Urogynecol J (2010) 21:553–556	Women with stronger PFM scored higher on orgasm and arousal domains of the FSFI	Lara LA et al. J Sex Med 2012;9:218-23	32 sexually active postmenopausal women who all had the ability to contract their pelvic floor muscles: PFMT had no impact on sexual function
Martinez CS et al. Acta Obstet Gynecol Scand 2014; 93: 497-502	Women with stronger PFM, scored higher than weaker PFM in FSFI score		

Are stronger PFM associated with better sexual function?

Int Urogynecol J (2015) 26:1735–1750
DOI 10.1007/s00192-015-2744-y

REVIEW ARTICLE

Does pelvic floor muscle training improve female sexual function? A systematic review

Cristine Homsi Jorge Ferreira[1,2] · Peter L. Dwyer[3] · Melissa Davidson[4] · Alison De Souza[5] · Julio Alvarez Ugarte[6] · Helena C. Frawley[7]

- 8 RCTs, 1341 women
- most studies indicated an improvement of at least one sexual variable in women with pelvic floor dysfunction
- High-quality RCTs specifically designed to investigate the impact of PFMT on women's SF are required.

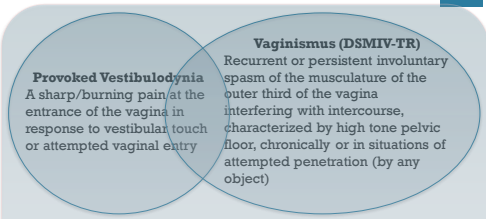
Possibly, a relaxed pelvic floor and mindful attention to sexual stimuli and bodily sensations is a more effective means of enhancing sexual arousal and orgasm

Sexual function in women with pelvic floor dysfunction

- Studies on pelvic floor dysfunction and sexual dysfunction: conflicting results
- Limitation: no distinction between high-tone and low-tone pelvic floor dysfunction
- 85 patients referred to physical therapy were divided in a high and low pelvic floor tone:
  - women in the middle age group: better sexual function than younger (< 30 yrs) and older (> 50 yrs) women
  - women with low tone pelvic floor had higher sexual function scores than women with OPF
  - Women with a low tone pelvic floor had lower FSFI sexual pain scores.

Bortolami A et al, J Sex Med. 2018;12(5): 1233-41

Female genito-pelvic pain/penetration disorder



DSM-5: genito-pelvic pain/penetration disorder

Assessment of PVD

Medical History

- Pain characteristics
- Musculoskeletal history
- Bowel and bladder function history
- Medications: OC, depo-provera, antibiotic treatment, psychotropic medications
- Comorbid medical or mental health conditions and treatments
- Hormonal status (pre vs post-menopausal, post-partum, lactation)

Psychosocial and Sexual Assessment

- Desire, arousal, orgasm, sexual distress
- Thoughts, emotions, behaviors, couple interactions, avoidance behaviors, negative partner responses, catastrophizing, hypervigilance, fear of pain, anxiety and depression
- Current romantic relationship
- Childhood trauma, including abuse and neglect, and any adult negative sexual experience
- Validated self-report questionnaires (eg, Female Sexual Function Index [FSFI])

Goldstein AT et al, J Sex Med. 2016 Apr;13(4):572-90

Assessment of PVD

Physical examination

- Interactive educational pelvic examination
- Vulvoscopy
- Speculum examination:
  - Atrophy, erythema, erosions, ulcerations, abnormal discharge, synechiae
  - pH testing, wet mount, and potassium hydroxide (KOH) prep
- Pelvic exam:
  - Use one finger
  - urethra and bladder trigone
  - levator ani muscles
  - ischial spine and pudendal
  - bimanual examination
  - Recto-vaginal examination when clinically required (endometriosis)

Sensory Evaluation

- Moistened cotton swab
- Medial thigh, buttocks, and mons pubis, labia majora, clitoral prepuce, perineum, and intra-labial sulci
- The medial labia minora should be gently touched lateral to the Hart line,
- Palpate the vestibule gently at five locations : at the ostia of the Skene glands, at the ostia of the Bartholin glands and at 6 o'clock at the fossa navicularis.
- Note involvement of whole vestibule versus posterior vestibule only

Goldstein AT et al, J Sex Med. 2016 Apr;13(4):572-90

Medical Treatment of PVD

Neuroproliferative PVD:
- topical anaesthetics
- antidepressants,
- antiseizure drugs
- capsaicin cream
- vulvar vestibulectomy

Hormonally mediated PVD:
- stopping hormonal contraception
- topical estradiol (with or without testosterone) to the vestibule

Hypertonic pelvic muscle dysfunction:
- physiotherapy,
- muscle relaxants (valium suppositories)
- Botulinum toxin injections
- cognitive behavioral therapy

Goldstein A. Moving beyond the diagnosis of vestibulodynia: a holiday wish list. 2009;3227–9

Medical Treatment of OPF: BTTA injections

Author and year	N. patients	Follow-up	dosage	location	improved	cured
Brin & Vapnek, 1997	1	24 months	10 units 40 units			1
Ghazizadeh and Nikzad, 2004	24	2-24 mo	15-400 mIU		23/24	75%
Abbott et al, 2006	30 pts 30 controls	3-6 mo	80 units	PF muscles		
Shafik & El-Sibai, 2000	8 pts 5 controls	10.2 ± 3.3	50 U	Bulbospongiosum	8/8	
Bertolasi et al, 2009	33 pts		20 mIU doses			(82%)
Yoon, 2007	7 pts	24 mo	20 U 40 U	Vestibule, LA, perineal body	7/7	2/7
Adelowo et al, 2013	29 pts	4 mo	100-300 U	LA	79%	
Nesbitt-Hawes et al, 2013	37 pts	26 wks	100 U	pubococcygeus and puborectalis	100%	70.2%
Pacik, 2017	241 pts	5.1 wks	100-150 U	Bulbospongiosum		71%

Sexual arousal and OPF in women with genito-pelvic pain/penetration disorders

- Apparently, genital response in women with dyspareunia is not impaired
- Genital response was found to be impaired, however, by fear of pain
- Brauer et al: diminished genital arousal both in women with dyspareunia and in sexually functioning women, during erotic film viewing when the participant was under the threat of a painful stimulus at her ankle (= fear of pain)

Brauer M et al Arch Sex Behav 2006;35:191-200
Brauer M et al Eur J Pain 2007;11:788-98.

Sexual arousal and OPF in women with genito-pelvic pain/penetration disorders

- Fear of pain may result in increased pelvic floor activity, as part of a defensive reaction
- The pelvic floor musculature, like other muscle groups, is **indirectly innervated by the limbic system** and therefore highly reactive to emotional stimuli and states
- Increased pelvic floor EMG has been observed in women with and without vaginismus in response to an anxiety provoking film

van der Velde J et al, Int Urogynecol J Pelvic Floor Dysfunct 2001;12:328–31

Pelvic floor overactivity as an emotional response

In cases of actual or imminent physical or mental pain the pelvic floor muscles will involuntarily, and often unconsciously, contract

- Pelvic floor activity was found to be significantly enhanced during sexually threatening film excerpts, but also during anxiety evoking film clips without sexual content
- **In sexual abuse survivors, the pattern of pelvic floor activity was highest during the sexually threatening film clip and the film clip with consensual sexual content.**

van der Velde J, Everaerd W. Behav Res Ther 2001;39:395–408

Evaluation and treatment approach to OPF

A individualized, multidisciplinary approach must be adopted, including:

Multimodal physiotherapy

- Education
- manual therapy
- Biofeedback
- electrical stimulation
- dilation technique

Psychosocial treatment

The Fear Avoidance Model of Pain

Medical treatment

- stopping OC
- topical estradiol
- muscle relaxants
- Botulinum toxin injections
- topical anaesthetics
- antidepressants,
- antiseizure drugs
- capsaicin cream
- vestibulectomy

EVALUATING AND UNDERSTANDING PELVIC FLOOR MUSCLE OVERACTIVITY – A PHYSIOTHERAPIST PERSPECTIVE

Mélanie Morin, PT, Ph.D

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University of Sherbrooke, CANADA
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Melanie Morin

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Affiliations to disclose†:

None

† All financial ties (over the last year) that you may have with any business organization with respect to the subjects mentioned during your presentation

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Objectives

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1. To review the physiology behind muscle tone
2. To discuss the current pelvic floor muscle (PFM) assessment tools and their advantages and limitations
3. To present the empirical evidence available related to the involvement of the PFMs in men and women with an overactive pelvic floor

Context

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- PFM overactivity plays a crucial role in several conditions such as bladder and bowel elimination disorders, genital/pelvic pain syndromes and sexual dysfunctions

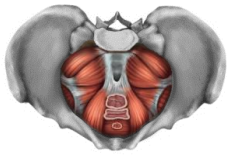

Image pelvicfloridian

WHAT EXACTLY IS MUSCLE TONE?

MUSCLE TONE

"State of the muscle", usually defined by its resting tension

Bo K et al. *An IUGA/ICS joint report on the terminology for the conservative and nonpharmacological management of female pelvic floor dysfunction*. Int Urogynecol J, **2017**. 28(2): p. 191-213.

Doggweiler et al. *A standard for terminology in chronic pelvic pain syndromes: A report from the chronic pelvic pain working group of the international continence society.* Neurourol Urodyn. **2017** Apr;36(4):984-1008.

PFM TONE

"State of the muscle", usually defined by its resting tension

- Muscle tone is evaluated clinically as the resistance provided by a muscle when a pressure/ deformation or a stretch is applied to it.
- Muscle tone has two components: (i) contractile (active) component; (ii) the viscoelastic (passive) component.

(Bø 2017; Doggweiler 2016)

Muscle physiology

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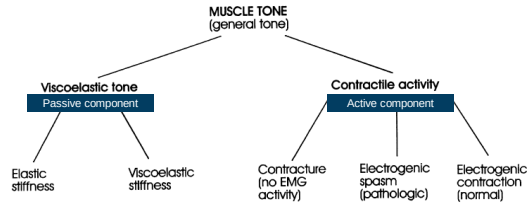

(Simmons, 1998)

Muscle physiology

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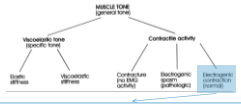


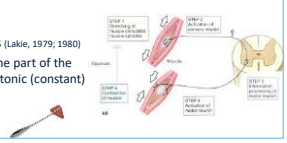
-Normal resting activity

-Recorded by EMG

-Resting activity = controversies (Lakie, 1979; 1980)

-The urethral sphincter and some part of the levator ani muscle may have a tonic (constant) activity (Deindle 1993; Vodusek 1982)

-Myotatic reflex



Muscle physiology

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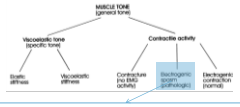

-Pathological involuntary electrogenic contraction

-Unintentional activity that is amenable to voluntary control (Simmons 1998)

- psychological distress or anxiety;
- overload;
- inefficient (untrained) use.

-Can be amenable to voluntary control (biofeedback) (Bergeron, 2001)

Muscle physiology

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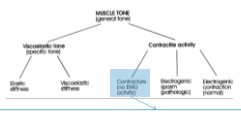

-**Contracture** arising endogenously within the muscle fibers independent of EMG activity (Simmons 1998)

-**Trigger point:** a tender, taut band of muscle that can be painful spontaneously or when stimulated. The taut band is electrically silent (Bø 2017; Doggweiler 2016).

Trigger point objective assessment

- Ultrasound and thermal imaging (Jafari 2018; Cojocarou 2015; Vecchiet,1993)
- Mechanosensitivity and ultrasound (Calvo-Lobo 2017)
- Hand-held compliance meter (Fischer 1987)
- Chemical mediators (Simons 1999)

Muscle physiology

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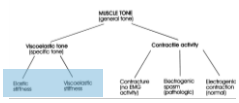
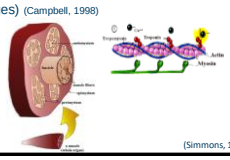


1- Actin and myosin (extensibility of bridges) (Campbell, 1998)

2- Cystoskeleton (titin and desmin)

3- Conjunctive tissues surrounding
muscle fiber (endomysium),
fascicule (perimysium)
muscle (epimysium)



(Simmons, 1998)

PFM assessment tools

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Palpation | EMG | Manometry | Ultrasound | Dynamometry

WHICH COMPONENTS OF TONE ARE ASSESSED WITH THE CURRENT PFM ASSESSMENT TOOLS?

PSYCHOMETRICS (RELIABILITY - VALIDITY)?

INVOLVEMENT IN THE PATHOPHYSIOLOGY OF CHRONIC PELVIC PAIN?

Palpation

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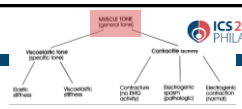

- General muscle tone
  - Devreese's scale (normo-, hypo-, hyper- tone) (Devreese 2004)
  - Dietz's scale (0 to 5, includes pain) (Loving, 2014)
  - Lamont's scale (0 to 4, withdrawal behavior) (Reissing 2004)
  - **Reissing's scale** (Reissing 2005)
    - + Good inter-rater reliability (Reissing 2005)
    - + Sensitivity to change (Gentilcore-Saulnier 2010)
    - - SUBJECTIVITY (Gentilcore-Saulnier 2010)

7 level
+3 very hypertonic
0 normal
-3 very hypotonique

✓Assessed at 3h, 6h and 9h
✓Superficial (external) and deep (internal)

Women with vulvodynia, vaginismus and CPP showed higher tone in comparison with asymptomatic controls as assessed with Reissing's, Lamont's and Dietz's scales (Reissing 2004;2005; Gentilcore 2010; Loving, 2014)

Palpation

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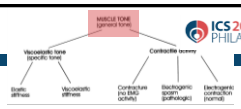

- Relaxation capacity
  - 0 complete relaxation to 4 remains contracted – good reliability (Reissing 2005)
  - Sign. difference in women with vulvodynia and controls (Gentilcore 2010)
- Flexibility
  - Antero-posterior distance in cm - good reliability (Boyle 2007)
  - Sign. difference in women with vulvodynia and controls (Gentilcore, 2010)

0 (less than one finger insertion) to 4 (two finger insertions with fingers abducted horizontally ≥2 cm)

Palpation

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SGS Papers ajog.org

Physical examination techniques for the assessment of pelvic floor myofascial pain: a systematic review

Melanie R. Meister, MD, MSCI; Nishkala Shivakumar, BS; Siobhan Sutcliffe, PhD, ScM, MHS; Theresa Spitznagle, PT, DPT, WCS; Jerry L. Lowder, MD, MSc

55 studies included

- Methodology varied
- Psychometric properties of TP assessment in the PFMs are scarcely studied.

Fitzgerald, 2003

EMG

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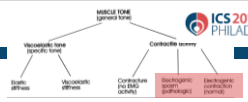
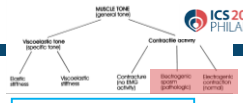


PFM resting activity

- Recording of the electrical current travelling along the muscle fibers at rest
- **EMG at rest**
  Vaginal probe (n=27 asymptomatic women)
  r=0.723 – 0.821 (Engman, 2004)
  Vaginal Femiscan
  (n=17 nuliparous continent women)
  ICC = 0.88-0.86 (Grape, 2009)
  MAPLe (n=168 continent women)
  ICC= 0.73-0.85 (Voorham-van der Zalm, 2012)
- These confounding factors affect inter-subject comparisons (Auchincloss, 2009)

EMG



PFM resting activity

Significant difference

White, 1997

Frasson, 2009

Loving, 2014
CPP

Non-significant difference

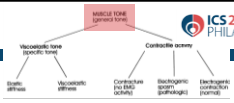
Reissing 2004

Engman, 2004

Gentilcore,2010

Naess, 2015

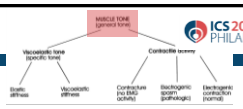
Manometry



- Measurement of resting pressure; in mmHg or cmH_2O by using a pressure device (a manometer) inserted into the urethra, vagina or anus.
- Good reliability in supine (Frawley 2006; Hundley 2005)
  - Calibrated to zero prior to insertion
  - Not clear how much the probe should be inflated prior to measurement. The latter would influence the probe size.
  - Probe size and brand are known to influence the measurement (Bo, 2005; Barbosa 2009)
  - Placement of the probe is also important (Guaderrama, 2005; Jung, 2007)

Women with vulvodynia (n=35) had significantly higher vaginal resting pressure than controls (n=35) (Naess 2015)

3D/4D Ultrasound



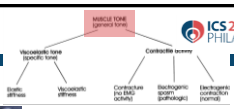
- Reliability (Dietz 2005; Majida 2009; Braekken 2008; 2009)
- Indirect assessment of PFM tone

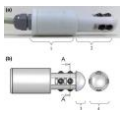
+ Non-painful and do not distort anatomy

- Sign. difference in women with vulvodynia (n=56) and controls (n=56) at rest (Morin 2014)

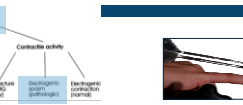
  Asymptomatic women (n=56) and women with PVD (n=56)
  - More cephalo-ventral bladder neck position
  - More acute ano-rectal angle
  - Larger levator plate angle
  - Lower levator hiatal diameters and area
- Sign difficulties to contract and control the PFMs (Morin 2014)
- Similar findings in men with CPP (Davis 2011)

Intra-vaginal dynamometers





Intra-vaginal dynamometers



THE JOURNAL OF SEXUAL MEDICINE

Heightened Pelvic Floor Muscle Tone and Altered Contractility in Women With Provoked Vestibulodynia

Mélanie Morin, PT, PhD,[1] Yitzchak M. Binik, PhD,[2] Daniel Bourbonnais, OT, PhD,[3] Samir Khalifé, MD,[4] Stéphane Ouellet, MD,[5] and Sophie Bergeron, PhD[6]

J Sex Med 2017;14:592–600

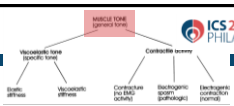
Aim: To compare PFM tone (the relative contribution of its active and passive components) in women with PVD (n=56) and asymptomatic controls (n=56)

Combination of EMG and dynamometry - Good reliability (Morin, 2008)

We showed an increase in both the active and the passive component of PFM tone

Women with vulvodynia had significantly higher resting forces and stiffness

Dynamometer



- Myotonometer (MyotonPro)
  - The device exerts mechanical impulses followed by release inducing damped oscillation on the muscle at rest
  - Summative contribution of active and passive component
  - Several parameters can be extracted from the oscillation curve, such as muscle stiffness
  - Good test retest reliability (Davidson, 2017)
  - Superficial muscle assessment

Women with vulvodynia had significantly higher stiffness than controls (n=35) (Davidsson 2017)

Muscle physiology

Fear- avoidance model by Vlaeyen et al. 2000

- The statistical model explained 28% of the variance related to pain intensity during intercourse [F(8,164) = 9.497, p<0.001]
- The PFM function could explain an additional 9% of pain intensity beyond that accounted by the fear-avoidance variables
- Pain intensity was negatively associated with
  - Strength
  - Speed of contraction
  - Flexibility (maximal tolerated aperture)

(Benoit-Piau 2018, Clin J Pain Epub)

Summary – assessment tools

- There is no gold standard for assessing PFM tone
- There are no normative data available
- Most of the tools available measure global PFM tone (i.e., summative contribution of active and passive components)
- A combination of tools is probably the most suitable approach to investigate PFM tone

Summary of findings- PFM overactivity

The available evidence in women with vulvodynia/CPP:

- Elevated global PFM tone (measured by ultrasound, dynamometry and manometry)
- TPs (measured by palpation)
- Increased viscoelastic properties (dynamometer combined with EMG)
- Some patients, elevated tone explained by electrogenic causes (evaluated by EMG)

In men with chronic prostatitis/CPP:

- Elevated global PFM tone (measured by ultrasound)
- TPs (measured by palpation)

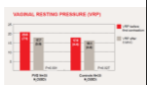
HOW CAN THESE ASSESSMENTS GUIDE OUR TREATMENT?

ARE PHYSIOTHERAPY MODALITIES EFFECTIVE FOR REDUCING PELVIC FLOOR TONE?

Effects of physiotherapy

EMG biofeedback (Glazer,1995; McKay 2001; Bergeron 2001; Danielsson 2006)

- Address the electrogenic cause
  - Reduction in pain 34-66% of participants
  - Reduction in PFM resting pressure after a maximal contraction in women with PVD indicating that contracting the PFMs can be used as a muscle relaxation technique (Naess 2015)



General relaxation techniques (Hilton 2011)

- Stress management, relaxation breathing, relaxing time with a walk, hot bath, yoga, and meditation

Effects of physiotherapy

Electrical stimulation

- For reducing pain- TENS (Murina 2008; Dionisi 2008)
- For reducing tension / improving muscle control
  - Reduction of pain (Nappi 2003; Morris 1987; Nappi 2003; Fitzwater 2003)
  - Improvement in strength and in relaxation (EMG) (Nappi 2003)

Effects of physiotherapy

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Manual therapy (Trigger point / Myofascial release)

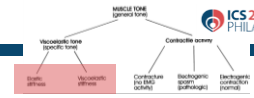
l chronic

Archives of Physical Medicine and Rehabilitation
Available online 17 July 2018
In Press, Accepted Manuscript

Trigger point manual therapy for the treatment of chronic non-cancer pain in adults: a systematic review and meta-analysis

Diarmuid Denneny MSc [1, 5], Helena C. Frawley PhD [3, 6], Katrine Petersen MSc [1], Rebecca

Effects of physiotherapy



Stretching/ insertion (Idama 2000; Murina 2008)

- Sign. reduction of pain in women with dyspareunia
- Auto-insertion - an effective adjuvant to other therapies

Proprioceptive neuromuscular facilitation (O'Sullivan 2000)

- Contract-relax to promote relaxation
- Efficacy not studied in PFM physiotherapy

Effects of physiotherapy

Multimodal physio

(Goldfinger 2009; Gentilcore-Saulnier 2010; Bergeron 2002; Goldfinger 2016; Morin unpublished)

- Sign. reduction of pain in 51-78% of patients
- Improvement in sexual function
- Reduction in PFM tone (using the Reissing's scale)
- Improvement in relaxation (0 fully able to return to their resting state to 4 remained fully contracted)
- Improvement in flexibility (transverse diameter 0 (less than one finger insertion) to 4 (two fingers abducted ≥2 cm)
- Increase in PFM strength (modified oxford)

Effects of physiotherapy

	Physiotherapy			Lidocaine		
	Baseline	Post-tx	6-month	Baseline	Post-tx	6 month
Passive force (N)	1.1(0.1)	1.2(0.1)	1.2(0.1)	1.3(0.1)	1.3(0.1)	1.3(0.1)
Maximal aperture (mm)	22.0(0.8)	29.4(0.8)	27.6(0.9)	20.3(0.8)	22.2(0.8)	21.8(0.9)
Maximal strength (N)	3.0 (0.2)	3.4 (0.2)	3.6(0.2)	2.9(0.2)	2.9(0.2)	3.0(0.2)
Number of contractions	8.0(0.4)	10.7(0.4)	11.0(0.4)	8.3(0.4)	8.1(0.4)	9.3(0.4)
Slope of the ascending curve (N/s)	5.2(0.5)	8.5(0.6)	9.1(0.6)	4.8(0.4)	5.1(0.5)	5.9(0.5)
Slope of the descending curve (N/s)	4.4(0.3)	6.1(0.4)	6.5(0.4)	3.5(0.4)	3.4(0.4)	3.9(0.4)

*** ***

*Adjusted mean ± standard error. ***p<0.0001*

Morin unpublished

Summary – treatment

- The effects of physiotherapy modalities on PFM function are not well studied.
- We need more research to understand the underlying mechanisms of action of our interventions.

THANK YOU !

Terminology

- Muscle tone
- Hypertonicity: is a general increase in muscle tone that can be associated with either elevated contractile activity and/or passive stiffness in the muscle, and may exist in the absence of muscle activity altogether. "Increased tone" is preferred when the cause is non-neurogenic.
- Hypotonicity: general decrease in muscle tone that can be associated with either reduced contractile activity and/or passive stiffness in the muscle. "Decreased tone" is suggested
- Spasm / Cramp
- Contracture
- Trigger point
- Stiffness
- Flexibility
- Tension: may have a similar meaning to tone and stiffness

(Bø 2017; Doggweiler 2017)

The OverActive Pelvic Floor: A "Fresh" Perspective

Applying a Biopsychosocial Framework in Clinical Practice

Carolyn Vandyken, PT

Carolyn Vandyken, PT

Affiliations to disclose†:

None

† All financial ties (over the last year) that you may have with any business organization with respect to the subjects mentioned during your presentation

Funding for speaker to attend:

- [X] Self-funded
- [ ] Institution (non-industry) funded
- [ ] Sponsored by:

Treating the Patient as a "Whole" Person

Biopsychosocial approach

Going Against the Grain: Anti-fragile

Central Sensitization

Operationally defined: CS is the amplification of nerve signals within the CNS which elicits pain hypersensitivity

Woolf, C. Central Sensitization: Implications for the diagnosis and treatment of pain. *Pain.* 2011 March; 152(3 suppl.):S2-15

Phillips, K et al. Central Pain mechanisms in chronic pain states-maybe it is all in their head. *Best Pract Res Clin Rheumatol.* 2011 April; 25(2):141-154

Pain Syndromes Consistent with Central Sensitization

(Clifford Woolf 2012)

- Fibromyalgia
- Chronic fatigue syndrome (CFS)
- Irritable Bowel Syndrome (IBS) and other functional GI disorders
- Temporomandibular Joint Disorder (TMJD)
- Restless Leg Syndrome (RLS)
- Idiopathic Low Back Pain (LBP)
- Multiple Chemical Sensitivity (MCS)
- Primary Dysmenorrhea
- Headache (tension > migraine, mixed)
- Migraine
- Interstitial Cystitis/Chronic Prostatitis/Painful Bladder Syndrome
- Chronic pelvic pain and endometriosis
- Myofascial Pain Syndrome / Regional Soft Tissue Pain Syndrome

Physical Changes that Occur in Central Sensitization

- Within the Neurons
  - ↓ threshold so that they fire more easily
  - ↓ rest period between firing
  - Sensor end of neuron releases inflammatory products- neurogenic bogginess
- Within the Spinal Cord
  - Sprouting of receptors in DRG
- Within the Brain
  - Body map of injured area enlarges in S1
  - Poor coordination between M1 and S1
  - ↑ adrenalin and cortisol production: fight/flight
  - ↑ fear/anxiety/depression/anger which winds up system further

(Pearson, N. Understand Pain, Live Well again 2010)

Why do We Have Trouble Making this Shift?

Nijs (2012):

1. Self reflection of the clinician- *do pain questionnaires yourself*
2. Assessment of attitudes and beliefs in patients with chronic musculoskeletal pain- *use PCS, TSK, DASS with our patients*
3. Therapeutic Neuroscience Education (TNE)- *look at the evidence*
4. Clinical reasoning including reconceptualization- *it has to change our practice*
5. Therapy focusing on the right structures- *tissues or nervous system*

Nijs J., Roussel N., VanWilgen P., Koke I., Smeets R. Thinking Beyond muscles and joints: Therapists' and patients' attitudes and beliefs regarding chronic musculoskeletal pain are key to applying effective treatment. Manual Therapy (2012)

Putting it into Practice

Jessica: History

- 6 weeks post-partum, P2/G2
- Very rapid delivery: felt "out of control"
- No time for an epidural
- First delivery- epidural, very controlled
- Complaints: heaviness, pain with being up on feet for > 30 minutes, carrying/lifting, bulge on self-palpation, constipation
- Saw a pelvic health PT at 4/52 on recommendation of her midwife
- First PT went right to strengthening her pelvic floor with a Dx of a Grade 1 Uterine prolapse

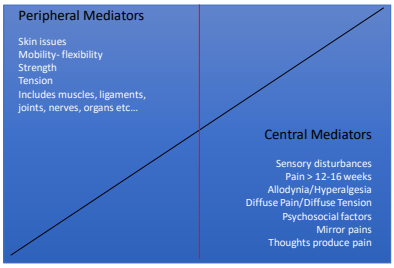
Jessica: Screening

- Jessica did not feel "listened to"
- Very anxious about prolapse diagnosis
- Reporting feeling "blue" "out of sorts"
- Reached out to me for a 2nd opinion
- Distress questionnaires:
  - DASS 21: Depression=32, Anxiety=16, Stress=32 (Severe in all categories)
  - ACE score = 3 (Adverse Childhood Experiences)
  - FreBAQ (Fremantle Questionnaire)= 3 (WNL)
  - Central Sensitivity Inventory (CSI)= 44 (>40 is +ve)
  - Catastrophization (PCS)= 40 (severe category)
  - Positive Affect (PANAS)= 17 (< 30 is concerning)
  - Fear Avoidance (TSK)= 58 (>35 is a concern)
  - Self-Efficacy= 3 (extremely low self-efficacy)

Jessica: Physical Exam

- No allodynia
- Connective tissue tension in abdominal wall, groin and thighs
- Internally, tension in OI bilaterally rectally and vaginally
- Grade 1 "softening" of anterior, posterior vaginal walls and uterine position= normal??
- I don't test strength in an overactive pelvic floor because you are not getting an accurate representation of ability to contract

Still in the Healing Stage Of Normal Birth Trauma



Significant Distress

Jessica: Treatment

- Started with Breathing Qi Gong (global tension in abdominal wall, thighs)
- Started with an OI stretch (local tissue tension)
- Pain education
  - Relationship of distress to tension
  - Tension and pain are OUTPUTS
- Prolapse education
  - Normal softening of the walls
  - Too early to diagnose a prolapse

Jessica: Treatment

- Tension resolved in 3 visits
- Strength on Visit 3 was Grade 3/5 sec/5 reps
- Poor coordination with a cough: The Knack
- Did a fibre diary and addressed toileting habits
- Started positive affirmations to increase low positive affect (daily while nursing)
- Start a daily walking program (favorite exercise is kickboxing)
- Social work referral for high DASS scores
  - Previous counselling for anxiety

Jessica: Treatment

- Used another 3 visits to build strength and coordination including High Intensity Interval training to prepare for kick boxing
- Strength on Visit 6 (3/12 later) was Grade 4+/10 sec/30 reps
  - Maintenance routine: 2 kegels post-void
- Great coordination with a cough: The Knack
- Discussed long term exercise strategies with regards to working in/working out
  - Balanced exercise diet : Cardio, ERR, weights

Jessica: Outcomes

- Good compliance- Motivational Interviewing
- 6 visits over a period of 4/12
- Resolved pressure feeling; no prolapse
- Committed to a regular exercise program including walking/kickboxing, qi gong, and weights
- Central Sensitization Inventory= 28 (44)
- Pain Catastrophization Scale = 8 (40)
- DASS 21: Stress= 8 (32), Anxiety= 6 (16), Depression= 12 (32) (mild)
- Tampa Scale of Kinesiophobia= 30 (58)
- Fremantle Back Questionnaire= 0 (3)
- Self-Efficacy= 10 (3)

Barbara- History

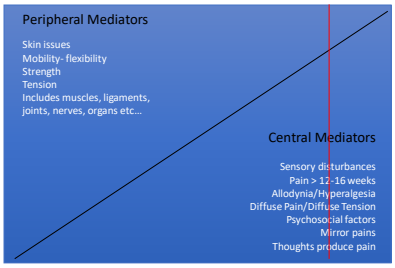
- 59 y/o Occupational Therapist
- Recently divorced; just bought her own house; moving to an online charting system at work; ++ stress
- Reported significant, debilitating depression
- Still at work, but overwhelmed
- Diagnosed with Interstitial Cystitis because of frequency during the day (15x/day and 5x/night) two years ago
  - Coincided with her marital distress
- c/o perineal and suprapubic pain; relieved temporarily by voiding
- Just started Cymbalta 1/52 prior to assessment

Barbara-Screening

- Inadequate social support system- 1 friend, son who lived 3 hours away
- Not sexually active; single
- No incontinence; Bowels healthy
- DASS- Stress= severe (27)
- DASS- Depression= moderate (18)
- Low Positive Affect (PANAS)= Low (19)
- CSI= 44
- Catastrophization= 22 (moderate)

Barbara-Physical Exam

- Hard time focusing; very teary
- Did not do internal exam for two visits because of level of overwhelm
- When we did her physical exam, she had minimal tension in the obturator internus bilaterally
- Everything else was normal; good timing, no prolapse, good strength
- Minimal pain education given:
  - Sensitized pain system vs. tissue drivers
  - Interstitial Cystitis vs. Bladder Pain Syn.
- Delayed further education- not processing cognitively at the moment



Drivers of Central Pain Mechanisms: Stress and Lack of Social Support

Barbara-Treatment

- Goal: To get depression under control:
  - Gentle Yoga to Overcome Pain (lifeisnow.ca)
  - Toilet meditation (physioyoga.ca)
  - Gratitude practice to increase positive affect
- Bladder Diary re-tested after 3rd visit: Started a timed voiding program using:
  - Breathing, Kegels and distraction to increase her time between voids

What does the Research Say?

There is good evidence that yoga may be useful for several pain-associated disorders, even short term practice, for low back pain, irritable bowel syndrome, depression, fibromyalgia, and chronic neck pain

(Bussing et al, 2012)

Evidence suggests that yoga is an acceptable and safe intervention, which may result in clinically relevant improvements in pain and functional outcomes associated with a wide-range of MSK condition

Ward (2013)

Strong evidence for short- term effectiveness and moderate evidence for long-term effectiveness of yoga for chronic low back pain

Cramer et al (2012)

Barbara-Outcomes

- Talked to her boss about getting more support for online charting
- Joined a local community group in her new neighbourhood to increase social interactions
- 5 visits- painfree; normal frequency
- Bladder Diary: one void at night, and 7-8 voids during the day
- Reconceptualized IC/BPS
- DASS- Depression (mild)= 12 (18)
- DASS- Stress (mild)= 16 (27)
- PANAS= 26 (target=30) (19)
- Catastrophization= 8 (normal) (22)

Can We Hit the Target?

Treatments of the physical body may be just as valuable in people with persistent pain (BIO).

The central nervous system is altered by inputs from the physical body

BUT

Treatment needs to be done within the context of a

BIOPSYCHOSOCIAL PERSPECTIVE

AND

It needs to start with **Pain Biology Education and Distress Questionnaires**

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