W38: Digital palpation to imaging: how should pelvic-floor-muscle evaluation tools influence physiotherapy practice?

Workshop Chair: Chantale Dumoulin, Canada

21 October 2014 14:00 - 18:00

Start	End	Topic	Speakers
14:00	14:15	Introduction, terminology definition	• Chantale Dumoulin
14:15	14:35	Digital evaluation	• Chantale Dumoulin
14:35	14:50	Manometry	• Mélanie Morin
14:50	15:10	Dynamometry	• Mélanie Morin
15:10	15:30	Electromyography	• Petra Voorham- van der Zalm
15:30	16:00	Break	None
16:00	16:20	Ultrasound	• Jennifer Kruger
16:20	16:30	MRI	• Chantale Dumoulin
16:30	17:00	How should PFM evaluation tools influence our practice with UI?	• Chantale Dumoulin • Petra Voorham- van der Zalm
17:00	17:20	How should PFM evaluation tool influence our practice with POP?	• Jennifer Kruger
17:20	17:40	How should PFM evaluation tool influence our practice with perineal pain?	• Mélanie Morin
17:40	18:00	Questions, Closing remarks	All

Aims of course/workshop

At the conclusion of this workshop, the participant will:

1. be able to identify the pelvic floor muscle evaluation tools (digital evaluation, pressure, EMG, dynamometry US and MRI), their psychometric properties (reliability, validity) and their advantages and disadvantages in clinical practice.
2. be able to identify the pelvic-floor morphological deficits and dysfunctions and the pelvic-floor morphological physiotherapy outcome predictions for a specific urogynaecological problem: UI, POP and vulvo-vaginal pain.
3. be able to use this new knowledge on pelvic floor muscle evaluation tools to plan and develop more efficient pelvic floor physiotherapy intervention for patients with UI, POP and vulvo-vaginal pain.

Workshop # 38

14:00 – 18:00, Tuesday October 21rst 2014

Digital Palpation to Imaging: How Do or Should Pelvic-Floor-Muscle Evaluation Tools Influence Physiotherapy Practice?

Topic 1. Digital Evaluation

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Aims of this topic:

1. To describe the pelvic floor digital evaluation technique to measure pelvic floor muscle function.
2. To present the pelvic floor muscle digital evaluation scales to assess a) passive strength, b) active strength, c) relaxation and d) levator injury.
3. To outline the psychometric properties of digital evaluation scales and how it correlates with other PFM assessment tools.
4. To discuss the advantages, limitation and clinical recommendations with the uses of digital evaluation of the pelvic floor muscle function.

Definition of pelvic floor muscle digital evaluation:

Pelvic floor muscle digital evaluation is the evaluation by one or two fingers of the pelvic floor muscle qualitative and quantitative function through perineal, vaginal or anal palpation. Pelvic floor muscle qualitative function is define by the qualitative/subjective appreciation of the pelvic floor muscle size, symmetry, pain, TP and the capacity to contract the PFM with isolation/compensation or facilitation. Pelvic floor muscle quantitative function is defined by passive strength or tone, active strength and reflex contraction of PFM (Messelink, 2005; Haylen, 2010).

Constituents of pelvic floor muscle digital evaluation:

The pelvic floor digital evaluation involves:

1- Communication and patient consent (Dumoulin, 2011)
2- Instruction on how to contract the PFM (Crotty, 2011)
3- Assessments through perineal evaluation (perineal elevation and perineal descent on pelvic floor muscle contaction, cough and Valsalva) (Haylen, 2010; Dumoulin, 2011)
4- Assessment through vaginal evaluation (morphological integrity and functional assessment) (Messelink, 2005; Haylen, 2010 ; Dumoulin, 2011)
5- Assessment trough anal evaluation (anal sphincter tone, strength and morphological integrity ; perineal body deficiency, puborectalis tone and stregth, pubococcygeous tone and stregth, iliococcygeous and coccygeous tone and strength) (Dumoulin, 2011 ; Haylen, 2010)

Parameters and scales:

1- Evaluation of pelvic floor passive force or tone (Simons, 1998; O'Sullivan, 2007)
    a. Scales for PFM tone and their psychometric properties (Devreese, 2004; Reissing, 2005; Boyle, 2007; Dietz, 2008; Gentilcore, 2010; Kavvadias, 2013)
2- Evaluation of pelvic floor active force or strength (Messelink, 2005)
    a. Scales for PFM active force or strength and their psychometric properties (Brink, 1989; Hawn, 1996; Isherwood, 2000; Bo & Finkenhagen, 2001; Heinter, 2001; Jeyaseelan, 2001; Laycock, 2001; Frawley, 2006; Messelink, 2005; Dietz, 2008; Slieker-ten Hove, 2009)
    b. One or two fingers (Dumoulin, 2003)
    c. Position in which the PFM strength is assessed (Bo, 2003;Devreese, 2004; Frawley, 2006)
3- Evaluation of PFM relaxation and their psychometric properties
    a. Scales for PFM relaxation (DeRidders, 1998; Reissing, 2005; Messelink, 2005)
4- Evaluation of levator (puborectalis) injury their psychometric properties (Dietz, 2008; Krugger, 2011, 2014)
5- Qualitative appreciation of PFM function (Dumoulin, 2011)
    a. Isolation of PFM contraction/compensation
    b. PFM volume at rest and during contraction
    c. Symmetry of left/right PFM fibers
    d. Pain, tension and TP
    e. Coordination with cough or Valsalva

Recommendations :
Positioning of the patient, the instructions to the patient, the use of one or two fingers, and the scale all need to be standardize and reported.

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Workshop # 38, 2 – 6 pm, Tuesday October 21st 2014

Digital palpation to imaging: how should pelvic-floor-muscle evaluation tools influence physiotherapy practice?

Topic 2. Manometry

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Aims of this topic:

1. To describe the properties and functioning of manometric measurements used to assess the pelvic floor muscles (PFM).
2. To outline the psychometric properties of the manometry including reliability and validity.
3. To discuss the clinical recommendations associated with the uses of manometry. The advantages and limitations of manometry will be discussed.

Constituents and methodology associated with manometry

In 1948, Dr. Kegel (1948) developed an intravaginal device, the perineometer, to assess PFM strength. The vaginal pressure probe was connected to a manometer in order to measure the intravaginal pressure from the PFM in millimeters of mercury (mmHg). Since then, several types of pressure probes with different shapes and technical properties have been developed and studied (Dougherty et al. 1986; Bo et al. 1990b; Laycock et al. 1994; Sanches et al. 2009). These tools can measure pressure in mmHg or cm H_2O. Several manometry units are commercially available and were developed in different countries: Camtech (Norway), Peritron (Australia), Miofeedback perina (Brazil), Gymna (Belgium), etc.

Reliability

Several muscle parameters have to be defined to ensure a comprehensive assessment of the PFM and hence, a thorough understanding of the pathophysiology of incontinence, prolapse and pain conditions. Good intra-rater (test-retest) reliability has been demonstrated for maximal squeeze pressure (ICC ranging from 0.88 to 0.96) and resting pressure (tone) (ICC=0.74-0.77) (Bo et al. 1990b; Kerschan-Schindl et al. 2002; Hundley et al. 2005; Frawley et al. 2006b; Frawley et al. 2006a; Rahmani et al. 2011). Acceptable inter-rater reliability for strength parameter was found by Ferreira et al. (2011). As shown in these studies, the peritron was found to be a reliable device. It was suggested to recalibrate the device to zero just before every effort. Maximal strength could be reliably evaluated during a 3, 5, 10 s contraction by considering one trial or the mean of three trials.

Regarding the endurance, Frawley et al. (2006b), found the endurance measurement to be unreliable. Contrarily, Rahmani demonstrated good reliability when assessing the endurance during a sustained 60% maximal contraction (Rahmani et al. 2011).

One advantage of the pressure measurement is the possibility to perform the assessment in different positions (lying, sitting and standing). It has been argued that upright positions are more “functional” because urinary incontinence occurs in these circumstances. Yet, the clinical advantages of assessing women in a standing position have not been supported by scientific evidences and the effects these positions have on the muscles themselves are controversial (Bo et al. 2003; Frawley et al. 2006a). Overall, the parameters proved to be reliable in these positions, supine showing the highest reliability.

Validity and clinical uses

The validity of the measurement was studied by comparing the maximal squeeze pressure to other measurements. It was correlated with vaginal palpation, for instance, using:

- the Oxford scale (r=0.703-0.814) (Isherwood et al. 2000; Riesco et al. 2010; Da Roza et al. 2012b) and

- the Brink scale (r=0.68-0.71) (Kerschan-Schindl et al. 2002; Hundley et al. 2005).

Ultrasound measurements were also correlated with maximal pressure:

- the correlation was good (ICC=0.72-0.81) when comparing the maximal pressure to the bladder base movement evaluated with transabdominal US (Chehrehrazi et al. 2009; Riesco et al. 2010)
- the correlation was moderate when comparing the maximal pressure to bladder neck movement (r=0.43) (Thompson et al. 2006) and muscle thickness (r=0.49-0.70) and levator hiatus area (-0.46) assessed by transperineal ultrasound (Morkved et al. 2004; Braekken et al. 2013).
- Levator hiatus area was correlated with resting pressure (r=-0.46) and endurance (r=-0.40) (Braekken et al. 2013).

The validity of the measurement is also supported by the capacity of the measurement to detect changes following treatment (Bo et al. 1990a; Bo et al. 1999; Aksac et al. 2003; Da Roza et al. 2012a; Ahlund et al. 2013) and to discriminate between groups, e.g. continent and incontinent women (Thompson et al. 2006).

Recommendations

There are a few known precautions to bear in mind regarding the uses of the pressure perineometry. Increases in intra-abdominal pressure, occurring if a patient co-contracts the abdominal muscles (rectus abdominis), or strain instead of contracting the PFM can interfere with pressure measurements.

Some recommendations can be applied to ensure the validity of the measurement:

1-performing vaginal palpation before using the perineometer to make sure the patient is able to correctly contract her PFM;

2-observing the cranial movement of the vaginal probe during measurement of the muscle contraction;

3-not considering the contractions associated with the Valsalva manoeuver or retroversion of the hip (Bo et al. 1990a; Bump et al.

1996). It has been argued that manometry is not suitable to assess reflex contraction during a cough (Bo et al. 2011).

Moreover, it should be pointed-out that the use of perineometry is therefore difficult when a patient has a really low PFM strength, because no inward movement of the probe is possible in this case.

The size of the probe and the brand of the device were also demonstrated to influence the measurement (Bo et al. 2005; Barbosa et al. 2009). Barbosa et al (2009) compared the Peritron with two brazilian devices and Bo et al. (2005) compared the Peritron to the Camtech. Both studies conclude that, the measurements of vaginal squeeze pressure differ depending on the vaginal probe used. Results from published studies using various probes should, therefore, not be compared or combined in systematic reviews or meta-analyses.

The placement of the probe is another factor reported to be important. It was recommended to position the probe at the level of the PFM which corresponds to the high-pressure zone within the vagina (Guaderrama et al. 2005; Jung et al. 2007).

This presentation will draw upon these references:

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