

VALIDITY OF CLINICAL ASSESSMENT TOOLS TO EVALUATE INVOLUNTARY PELVIC FLOOR MUSCLE CONTRACTIONS DURING COUGHING.

Hypothesis / aims of study

In clinical practice an involuntary pelvic floor muscle contraction (PFMC) can be assessed by different tools such as visual inspection (VIP), palpation (PA), and transperineal ultrasound (US). An involuntary PFMC is described as a contraction that precedes an intra-abdominal pressure rise, e.g. during coughing and can be absent or present. Evaluation tools identifying an involuntary PFMC, are defined by the terminology joint report of ICS/IUGA; during inspection, no perineal downward movement should be observed, but rather an inward movement may occur due to the counter response of the PFMs and during palpation, a PFMC must be recognized. A cranioventral bladder neck displacement, measured by perineal ultrasound, is considered a PFMC. Although reliability of PFM strength assessment has been evaluated and clinically established, there is still a lack of consistency in evaluating an involuntary PFMC. The aim of this study was to compare outcome measures and strength of association between the above described evaluation tools.

Study design, materials and methods

One hundred forty-nine nulliparous women (mean age 26.3 years), without a history of pelvic floor dysfunction, confirmed by the validated German pelvic floor questionnaire, were included. The participants performed 3 series of three maximal expulsive coughs. During these series, US was used to assess a cranioventral bladder neck displacement, vaginal PA to evaluate a PFMC and VIP was used to evaluate a down- or inward movement. All measurements were done in the standing and supine position. The different measurement tools were statistically compared using the Pearson chi-square test or the Fisher exact test and the strength of association was reported with the phi coefficient (Φ). To adjust for multiple comparisons, a Bonferroni correction was applied which decreased the significance level to $\alpha_{Bonf} = 0.05 / 8 = 0.00625$.

Results

The sum of occurrence to evaluate the absence of a PFMC during coughing in the standing position, was 91.9% for US, 83.2% for palpation and 95.3% for visual inspection. In the supine position the sum of occurrence was 94% for US, 85.2% for palpation and visual inspection. The sum of occurrence to evaluate the presence of a PFMC in the standing position was 8% for ultrasound, 16.8% for palpation and 4.7% for visual inspection. In the supine position the sum was 6% for ultrasound, 14.8% for palpation and for visual inspection (table 1).

Cough St	Palpation		total sum	Cough St	VIP		total sum	Cough St	VIP		total sum			
Cough Sup	1	0		Cough Sup	1	0		Cough Sup	1	0				
US	1	7	5	12	Palpation	1	5	20	25	VIP	1	2	10	12
		3	6	9			11	11	22			2	7	9
	0	18	119	137		0	2	122	124		0	5	132	137
		19	121	140			11	116	127			20	120	140
total sum		25	124	149	total sum		7	142	149	total sum		7	142	149
		22	127	149			22	127	149			22	127	149

Table 1: Cross-tables includes numbers and total sum of absence or presence evaluated involuntary PFMC measured by ultrasound (US), palpation and visual inspection of the perineum (VIP). 0=present, 1=absent PFMC

Overall we found a significant relationship between US and palpation in the standing position and between palpation and visual inspection in both the standing and supine position but the values of the Phi-test, indicates a weak strength of association (table 2).

Table 1: P-Values of Pearson chi-square test / Fisher exact test (indicated by *) and phi coefficients of the palpation, visual inspection and the ultrasound measurements in supine and standing position.

		Cough supine		Cough standing	
		VIP	Palpation	VIP	Palpation
US	P-Value	0.622*	0.130*	0.100*	0.001*
	Φ coefficient	0.053	0.133	0.167	0.329
PA	P-Value	<0.000*		0.002*	
	Φ coefficient	0.413		0.325	

- US perineal ultrasound for cranioventral bladder neck displacement defined as positive values in both the x- and the y-axis (no displacement was considered as positive),
- VIP visual inspection of the perineum, no downward movement
- PA PFMC palpated with vaginal palpation

Interpretation of results

The results showed a significant association between ultrasound and palpation during coughing in the standing position and a significant association between palpation and inspection in both the standing and supine position. However, the strength of association was weak due to the large alterations in agreement between measurements. In the evaluation of an absence of PFMC in the supine and standing position, we found a high (83.2% and 96.4%) agreement between US, PA and VIP, but in the evaluation of a presence of PFMC, the agreement between measurements were very incoherent. In the standing position, the agreement between US and PA was 58.3% and for VIP 16.7%. In supine position 33.3% for PA and 22.2% for VIP. The agreement between PA and VIP was 25% in the standing position and 100% in the supine position. Remarkable was the unexpectedly low number of identified PFMC in all 3 measurements. The participants were healthy nulliparous subjects, so a higher rate of involuntary PFM response would be expected.

Conclusion

Although the results showed a significant association between US and palpation and between palpation and visual inspection, there exists a lack of consistency in identifying the presence of an involuntary PFMC. There may be a need to re-evaluate outcome measures or tools to identify an involuntary PFMC.

References

1. Messelink B, Benson T, Berghmans B, BØ K, Corcos J, Fowler C, Huat-Chye Lim P, van Lunsen R, Lycklama G, Nijeholt A, Pemberton J, Wang A, Watier A, van Kerrebroeck P. Standardization of terminology in pelvic floor muscle function and dysfunction. Report from the pelvic floor clinical assessment group of the ICS. *Neurourol and Urodyn*. 2005;24:374-380
2. Slieker- ten Hove MCP, Pool-Goudzwaard AL, Eijkemans MJC, Steegers-Theunissen RPM, Burger CW, Vierhout ME. Face validity and reliability of the first digital assessment scheme of PFM function conform the new standardized terminology of the ICS. *Neurourol and Urodyn* 2009;28:295-300
3. Lovegrove Jones RC, Peng Q, Stokes M, Humphrey VF, Payne C, Constantinou CE. Mechanisms of PFM function and the effect on the urethra during a cough. *Eur Urol*. 2010 Jun;57(6):1101-10.

Disclosures

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