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PELVIC FLOOR BIOMETRICS IN CONTINENT AND URINARY INCONTINENT ELDERLY WOMEN

Hypothesis / aims of study

A large number of women 60 and over experience urinary incontinence (UI) and its negative quality-of-life consequences; however, the pathophysiology of UI in this population is not completely understood. Thus, this study compared the pelvic floor muscle (PFM) and bladder-neck biometrics of continent and incontinent elderly women using a 3D/4D transperineal ultrasound (TPU) under 3 conditions: rest, PFM maximum voluntary contraction (MVC) and during Valsalva.

Study design, materials and methods

Women 60 years and older were recruited and included in the study if they were continent or reported at least weekly symptoms of stress or mixed UI in the 3 months prior to the evaluation, based on the Urogenital Distress Inventory (UDI).(1) Women were excluded if they had participated in PFM treatments within the last year or reported risk factors, medical conditions or medications that could have interfered with the study. Forty women ranging from 60 to 79, a mean age of 67.10 (4.94), participated in the study (20 continent and 20 with UI). To control for the potential effects of age, body mass index (BMI) and parity, participants were matched across the two groups based on age (±5 years), BMI (±3 kg/m^2) and vaginal delivery (yes/no; if yes ±2 deliveries).

An experienced physiotherapist taught the women how to perform PFM contractions correctly. Then, TPU imaging was performed with participants in a supine position after each had emptied her bladder. Pelvic floor axial and sagittal images were taken under the 3 conditions (rest, PFM MVC and Valsalva) with an Acuson Antares™ ultrasound (Siemens, USA Inc) using a 3-5MHz curvilinear 3D probe. Datasets were processed offline using the syngo fourSight™ ViewTool (V3.1). The investigator was blinded to the participants' continence status. One measurement, the LH area (LHarea) (i.e., the area bordered laterally and posteriorly by the pubovisceral muscle and anteriorly by the inferior border of the pubic symphysis), was taken from the axial images in the plane of minimal dimension, as previously described,(2) and for all 3 conditions. Measurements were also taken from the sagittal images; the bladder-neck (BN) position (X, Y) at rest, the BN cranio-ventral displacement (lift) on contraction and the BN dorso-caudal displacement (descent) on Valsalva.(2) Finally, the PFM height (i.e., the perpendicular distance between the ano-rectal angle and the horizontal reference line,(2) originating at the level of the posterior margin of the pubic symphisis) was also measured for all 3 conditions. As data were normally distributed, independent t-tests were conducted to compare measurements between the two groups.

Results

There were no differences between the groups in terms of age (p=0.45), BMI (p=0.44), vaginal deliveries (p=0.31), hysterectomies (p=0.19), atrophy index scores (p=0.63) or hormonal status (0.75); however, UDI scores were significantly different (p=0.001). Intra-rater test-retests were conducted on 20 participants to evaluate measurement reproducibility. The results showed good to excellent reproducibility for all parameters (ICC between 0.71 and 0.94). PFM biometrics for both groups are presented in Table 1.

Table 1: PFM biometrics in continent and incontinent elderly women

		Mean (SD)		
Conditions	**Measures**	**Continent (n 20)**	**Incontinent (n 20)**	**P-value**
Rest	LHarea (mm^2)	1433.00 (345.38)	1678.26 (316.29)	0.032*
	BN (Y) (mm)	29.98 (5.77)	29.47 (5.16)	0.775
	BN (X) (mm)	7.76 (7.02)	9.11 (4.03)	0.480
	PFM height (mm)	24.04 (8.43)	18.73 (5.72)	0.031*
MVC	LHarea (mm^2)	1102.45 (261.46)	1450.46 (387.97)	0.002*
	BN cranio-ventral displ. (mm)	9.16 (5.54)	7.96 (5.98)	0.514
	PFM height (mm)	26.63 (8.25)	18.25 (6.04)	0.001*
Valsalva	LHarea (mm^2)	1885.30 (683.15)	1878.32 (435.64)	0.973
	BN dorso-caudal displ. (mm)	18.17 (11.29)	18.80 (12.63)	0.875
	PFM height (mm)	14.08 (10.79)	11.65 (8.33)	0.438

Interpretation of results

At rest, there were significant differences between the continent and incontinent elderly women for two measurements, the LHarea and PFM height; this is indicative of better PFM support or tone in the continent women. These measurements also differed between groups during MVC; this is indicative of a more efficient contractile capacity in the continent. On Valsalva, however, no significant differences between groups were observed. It is important to note that a levator co-activation was found in some (9/20) incontinent women, which could have confounded the results during Valsalva. Although auditory biofeedback was given by the evaluator, UI women may have refrained from a maximum Valsalva, possibly to prevent leakage.

Concluding message

This study is significant in that it is, to our knowledge, the first to look exclusively at biometrics in elderly women with and without UI. Our TPU results suggest that there are differences in pelvic floor morphology between continent and incontinent elderly women; this group difference also aligns with MRI imaging findings for this population.[3] Further, similar intergroup biometric differences between incontinent and continent women were noted in populations of younger and middle-aged women. Ultimately, a better understanding of pelvic floor dysfunction in elderly incontinent women is important as it will inform the choice of UI intervention to the one best adapted to a specific dysfunction.

References

1. Qual Life Res. 1994 Oct;3(5):291-306.
2. Ultrasound Obstet Gynecol. 2004;23:615-25.
3. Neurourology & Urodynamics.2010;29(6):141.

Disclosures

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