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THE MEASUREMENT OF VAGINAL PRESSURE AND TRANSVERSUS ABDOMINIS MUSCLE THICKNESS MAY BE A PREDICTOR FOR PELVIC ORGAN PROLAPSE

Hypothesis / aims of study
Decreased vaginal pressure (VP) due to weakened pelvic floor muscles caused by parturition, aging, and decreased female hormone production is a major factor of urinary incontinence and pelvic organ prolapse (POP). It is suggested that transversus abdominis muscle thickness (TAMT) may be used as a marker to estimate pelvic floor muscle strength [1]. However few study has investigated the association between VP and TAMT in patients with POP.
The primary aim of this study is to clarify the relationship between them in patients with POP.

Study design, materials and methods
The subjects were divided into two groups: POP (Group P, n = 56, mean age 71.4 ± 7.2 years) and age matched non-POP (controls; Group C, n = 52, mean age 70.1 ± 6.8 years). TAMT was measured in the supine position with an ultrasound system (HITACHI Aloka Medical, Ltd. HI VISION Avius®, 7.5MHz, B mode). The measurement position was the middle of the costal margin and the iliac crest on the right anterior axillary line, with reference to previous reports [2]. TAMT was measured at four time points: at rest; at the peak inspiratory flow; at the peak expiratory flow (PEF); and at the maximum TAM contraction. We examined the association between POP and the TAMT. VP was measured with a perineometer (PERITRON®, Cardio Design Pty Ltd, Oakleigh, Victoria, Australia).

Results
In Group P, the TAMT was significantly less at the PEF and the maximum TAM contraction (3.6 ± 1.2 mm in Group P and 4.2 ± 1.2 mm in Group C at the PEF; P = 0.021, 3.8 ± 1.2 mm in Group P and 5.3 ± 1.3 mm in Group C at the maximum TAM contraction; P < 0,001).
In addition, Group P showed a significantly lower vaginal contraction pressure (9.5 ± 4.5 cmH2O in Group P; 20.3 ± 7.5 cmH2O in Group C; P < 0.001) and significantly shorter duration of vaginal contraction (4.3 ± 1.7 seconds in Group P; 6.9 ± 2.9 seconds in Group C; P < 0.001). For the association between the TAMT and VP, only the TAMT at the maximum TAM contraction showed a significantly positive correlation with VP (P < 0.001; r = 0.441). Similarly, during vaginal contraction, only the TAMT at the maximum TAM contraction showed a significant positive correlation with VP (P < 0.001; r = 0.328).
In addition, VA and TAMT at the maximum TAM contraction were considered independent predictors in patients with POP in multivariate analysis model, including age, body mass index, gravidity and delivery.
There was no correlation of the stage of POP with VP or with the TAMT.

The differences of transversus abdominis muscles thickness between two groups

	Group C	Group P	P value
Resting state (mm)	2.9 ± 0.9	2.8 ± 0.9	0.530
Maximum inspiratory state (mm)	2.6 ± 0.8	2.5 ± 0.9	0.735
Maximum expiratory state (mm)	4.2 ± 1.2	3.6 ± 1.2	0.021
Maximum contraction of TAM state (mm)	5.3 ± 1.3	3.8 ± 1.2	< 0.001

C: control, P: pelvic organ prolapse, TAM: transversus abdominis muscle

The differences of vaginal contraction pressure and duration between two groups

	Group C	Group P	P value
Vaginal contraction pressure (cmH2O)	20.3 ± 7.5	9.5 ± 4.5	P < 0.001
Duration of vaginal contraction (sec)	6.9 ± 2.9	4.3 ± 1.7	P < 0.001

C: control, P: pelvic organ prolapse

The relationship among pelvic organ prolapse and various factors

	Univariate analysis			Multivariate analysis		
	Odds ratio	95% CI	P value	Odds ratio	95% CI	P value
Age	0.975	0.922 - 1.029	0.356	-	-	-
BMI	1.203	1.070 - 1.369	0.002	1.172	0.967 - 1.408	0.088
Gravidity	3.232	1.929 - 5.928	< 0.001	0.215	0.010 - 4.688	0.329
Delivery	3.424	2.008 - 6.431	< 0.001	10.103	0.381 - 268.1	0.167
Vaginal contraction pressure	0.752	0.671 - 0.825	< 0.001	0.762	0.677 - 0.857	< 0.001
TAMT at maximum contraction	0.393	0.256 - 0.566	< 0.001	0.513	0.513 - 0.320	0.006

CI: confidence interval, BMI: body mass index, TAMT: transversus abdominis muscle thickness

Interpretation of results

The VP and transversus abdominis muscle work closely with the pelvic floor muscle and can be major factors that affects female lower urinary symptoms. There is also an association among VP, transversus abdominis muscle and vulnerability of the pelvic floor muscle. Although the vulnerability of the pelvic floor muscle is a major cause of POP, few studies have examined the effects of VP and transverse abdominal muscle on POP.

In the present study, in patients with POP, VP is lower than that of control group and there is a correlation between VP and TAMT at the maximum contraction.

In addition, VP and TAMT at the maximum contraction were the independent predictors in multivariate analysis.

Concluding message

The measurement of VP and TAMT may be a predictor for POP.

References

1. J Phys Ther Sci 2014. 26:1161-1163
2. J Phys Ther Sci 2011. 23:45-48

Disclosures

Funding: None. **Clinical Trial:** No **Subjects:** HUMAN **Ethics Committee:** Ethics Committee of Nagasaki University Hospital **Helsinki:** Yes **Informed Consent:** Yes