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ULTRASOUND VISUAL FEEDBACK MAY BE AS EFFECTIVE AS DIGITAL VAGINAL PALPATION FOR PELVIC FLOOR MUSCLE TRAINING.

Aims of study

Recent research has shown ultrasound imaging of the pelvic floor to be a valid and reliable tool for visualising and measuring pelvic floor muscle activity (1). However ultrasound has not been tested for use as a biofeedback tool during pelvic floor muscle training (PFMT). Tactile feedback during digital vaginal palpation remains the standard clinical tool for pelvic floor muscle biofeedback although it is a qualitative tool (2). The aim of this study was to compare the effectiveness of visual feedback using transabdominal ultrasound (US) to tactile feedback using internal vaginal palpation (PV) in PFMT for older women with urinary incontinence.

Study design, materials and methods

This was a single-blind randomised controlled clinical trial. Institutional ethics approval was obtained and the participants gave informed consent before enrolling. Twenty women aged 60 to 85 years with stress and/or urgency incontinence were randomly assigned using concealed allocation, to 10 weeks of either conventional physiotherapy (n=10) or ultrasound biofeedback only (n=10). Conventional physiotherapy involved teaching and feedback via internal vaginal palpation (PV) whilst the ultrasound intervention (US) involved visual feedback of PFM contraction using transabdominal ultrasound and no internal vaginal palpation. Both groups received 4 one-hour long sessions of individualised physiotherapy intervention. This included specific and functional PFMT, bladder education, and a home exercise program. Both groups continued with their home program until the follow-up assessment at 3months post-intervention.

Assessments occurred at baseline (T1), immediately post-intervention at 10 weeks (T2) and 3 months post-intervention follow-up (T3) by a pelvic floor physiotherapist who was blinded as to subject allocation. Successful PFMT was measured by improvement in continence outcomes (3) and an ability to displace the pelvic floor a greater distance as measured on ultrasound. The outcomes measured at all assessments were 1) the volume of urine lost using a 24 hour pad weigh test (PWT), 2) total accidents per week using an accident dairy (AD), 3) displacement of the pelvic floor as imaged on transabdominal ultrasound (USD) 4) and quality of life using King Health Questionnaire (KHQ), at baseline and follow-up only. Compliance to the exercise program and treatment advice was recorded using an exercise diary.

Data were analysed using Mann Whitney, Friedman, and Wilcoxon signed ranks tests as appropriate for each data set. Alpha was set at 0.05.

Results

There were no significant differences between the 2 groups (PV vs US) at baseline for age (71.8 ± 5.95y vs 75.3 ± 7.26y), BMI (20.1 ± 5.0 vs 21.6 ± 3.96), or parity (3[0-5] vs 3[0-4]).There were also no significant differences in the number who reported regular problems with constipation (30% vs 50%), cystitis (0% vs 10%), those who exercised regularly (90% vs 90%) or had previously undergone gynaecological surgery (30% vs 60%).

The 2 groups were not significantly different at baseline with respect to mean grams of urine loss measured by the 24 hour pad weigh test (p=0.65), or mean ultrasound displacement measures (p=0.54). However the number of leakage episodes reported in the accident diary (p=0.03) was significantly different, with the US group having more leakage episodes.

Within group results are presented in Table 1, and the comparison of changes between the 2 groups for the intervention (T2-T1) and non-intervention (T3-T2) phases are presented in Table 2.

Table 1. Results of assessments within each group.

	T1 mean ± SD	**T2 mean ± SD**	**T3 mean ± SD**	**Significance (Friedman test)**
PV group (n=10)				
PWT (gm)	81.2 ± 243.0	17.4 ± 38.8	13.3 ± 32.0	NS
AD (number)	3.8 ± 5.7	4.6 ± 3.7	3.8 ± 4.3	NS
USD (mm)	0.24 ± 2.7	0.54 ± 0.51	0.69 ± 0.5	NS
US group (n=10)				
PWT (gm)	215.0 ± 475.0	121.1 ± 323.5	81.0 ± 206.5	NS
AD (number)	8.2 ± 5.5	5.4 ±.6.8	3.2 ± 2.6	NS
USD (mm)	-0.11 ± 0.9	0.15 ± 0.6	0.64 ± 0.5	P=0.02*

* The significant changes were found to occur between T2 and T1 (p = 0.02) and between T3 and T1 (p = 0.01), Wilcoxon signed ranks test.

There was a trend towards improvement on all outcomes measured for each group. Significance was not reached, except in the ultrasound displacement measures for the ultrasound group, where significant improvement was demonstrated during both the intervention phase and over the whole study period.

Table 2. Change scores between the groups.

	PV group (n=10)	**US group (n=10)**	**Significance (Mann-Whitney)**
T2-T1 % change ± SD			
PWT	-79 ± 658	-20 ± 90	NS
AD	89 ± 247	-43 ± 57	P=0.05
USD	-44 ± 92	-43 ± 62	NS
T3-T2 % change ± SD			
PWT	338 ± 1160	-35 ± 75	NS
AD	12 ± 84	-7 ± 62	NS
USD	-18 ± 125	-9 ± 127	NS

Comparing the change scores, there were no significant differences between the 2 groups, except for accident diary scores during the intervention phase (T2-T1) when the ultrasound group reported significantly fewer accidents than the vaginal palpation group.

There were no significant differences between the 2 groups on any of domains of the Kings Health Questionnaire.

No significant differences in compliance to the program were found between the 2 groups (75% vs 81%, p=0.55). Using a VAS, no significant differences were found in the self-reported application of home advice (7.3 vs 8.6, p = 0.52) or in the home PFM exercise intensity (8.5 vs 9.4, p = 0.39).

Interpretation of results

There was a trend towards improvement for both groups, indicating both feedback methods may be effective for PFMT. Both groups changed similarly, indicating they may be equally effective methods of providing feedback. However, this small study had insufficient power to clearly indicate whether there may be a real difference between the two groups, because of the wide variance in the data.

Concluding message

Visual feedback from ultrasound imaging of the pelvic floor is as effective as tactile feedback from vaginal palpation for PFMT in older women with urinary incontinence as shown by improvement in continence outcomes. Ultrasound may be a useful tool for pelvic floor examination and training in situations where a per vaginum examination is not appropriate.

References

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