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URODYNAMIC ASSESSMENT DURING PELVIC FLOOR MUSCLE AND TRANSVERSUS ABDOMINIS CONTRACTION

Aims of Study

Previous studies have shown that > 30% women seem to be unable to correctly contract their pelvic floor muscles at their first attempt and that only 49% are able to effectively increase urethral pressure during pelvic floor muscle training (1). Contraction of the pelvic floor muscles has shown to produce a co-contraction of the transversus abdominal muscle. Some authors also claim that contraction of the transversus abdominis leads to co-contraction of the pelvic floor muscles, and that transversus abdominis training therefore may be an efficient indirect way to train the pelvic floor (2). However, contraction of the transversus abdominis has shown to increase abdominal pressure and also to depress the levator plate in as many as 43% of patients and 30% of well-trained physical therapists (3,4). The aim of the present study was to evaluate how contractions of the pelvic floor muscles, the transversus abdominis and a combination of the transversus abdominis + the pelvic floor muscles affect urethral and abdominal pressures.

Methods

Consecutive women with symptoms of stress, urge or mixed incontinence attending an urodynamic laboratory for routine urodynamic assessment were asked to participate in the study. Power calculation showed that 10 subjects were needed to detect a difference of 10 cm H_2O in urethral pressure rise with 90% power and α 0.05. Inclusion criteria were age between 18-70 years. Exclusion criteria were inability to contract either the pelvic floor muscles or the transversus abdominis evaluated by observation and palpation. All women were taught pelvic floor and transversus abdominis contractions by an experienced physical therapist. Pelvic floor muscle strength was measured by vaginal squeeze pressure (Camtech AS). Urodynamic assessment was done in a lithotomy position. A 8F catheter with two microtip transducers 6 cm apart (Camtech AS) was used to measure urethral- and bladder pressure. Abdominal pressure was estimated with an airfilled balloon catheter placed in the rectum. Pressures were set to zero at the beginning of each examination. Pressure changes in the bladder, urethra and rectum were recorded and closure pressure calculated during three attempts to contract the pelvic floor muscles, transversus abdominis, and transversus abdominis + pelvic floor muscles. The order of the three maneuvers was randomised, and the women performed three contractions of each maneuver. Comparison between the three maneuvers are reported as mean differences with 95% CI of the differences using Paired sample test. A p-value less than 0.05 was considered significant.

Results

Thirty-one women were asked to participate in the study. Five refused to participate, did not show up or were not able to understand instructions. Of the remaining 26 women four were not at all able to contract the pelvic floor muscle, and a further 13 subjects were excluded because they performed in-coordinated, inconclusive or not reproducible pelvic floor or transversus abdominis contractions evaluated by the physical therapist. Nine women were available for the comparison study.

Mean age was 52.9 years (SD 7.0) and mean BMI was 24.6 (2.5). One woman was training the pelvic floor muscles and one was training the transversus abdominis regularly. Mean pelvic floor muscle strength was 15.5 cm H_2O (SD 7.6). Mean resting urethral closure pressure was 42.8 (SD 8.3).

Table 1 shows the paired differences in urethral and abdominal (rectal) pressures when contracting the pelvic floor muscles, transversus abdominis and transversus abdominis + pelvic floor muscles. Urethral pressure rise during pelvic floor muscle contractions was significantly higher than urethral pressure rise during transversus abdominis contraction. Combining transversus abdominis and pelvic floor muscle did not change the increase in urethral pressure significantly compared to pelvic floor muscles alone, but a combination of transversus + pelvic floor increased urethral pressure significantly more than transversus alone.

Table 1. Pared differences in urethral (ureth) and abdominal (rectal) pressures (rect) (cm H_2O) when contracting the pelvic floor muscles (PFM), transversus abdomins muscle (TrA) and a combination of TrA + PFM. N=9. Mean with 95% confidence intervals (CI).

	Mean diff.	95% CI	p-value
PFMureth-TrAureth	8.3	2.6-14.1	0.01
PFMureth-TrA+PFMureth	-8.3	-18.3-1.6	0.09
TrAureth-TrA+PFMureth	-16.7	-24.6- -8.7	0.001
PFMrect-TrArect	-1.4	-5.7-2.8	0.461
PFMrect-TrA+PFMrect	-10.3	-16.0- -4.6	0.003
TrArect-TrA+PFMrect	-8.9	-14.2- -3.5	0.005

Conclusions

This study confirms results from previous studies demonstrating that many women are not able to contract the pelvic floor muscles correctly at their first consultation. However, also the transversus abdominis is difficult to contract, and practice may be required to perform correct contractions of both muscle groups. Pelvic floor muscle contraction seemed to increase urethral pressure significantly more than contraction of the transversus abdominis. Adding pelvic floor muscle contraction to the transversus abdominis contraction increased urethral pressure significantly over transversus abdominis alone, but not over pelvic floor muscles alone. Both pelvic floor muscle contraction and transversus abdominis contraction increased abdominal pressures. However, the increase in abdominal pressure from contraction of these two muscle groups may affect continence mechanisms differently. Contraction of the transversus abdominis may depress the levator plate while contraction of the pelvic floor muscles elevates the levator plate and makes a structural support for the bladder and the urethra preventing descent. Based on these results and previous studies we recommend pelvic floor muscle training to be performed via direct instruction of pelvic floor muscle contraction and not via the transversus abdominis.

References

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