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AN INVESTIGATION OF OPTIMAL CUES TO INSTRUCTION FOR A PELVIC FLOOR MUSCLE CONTRACTION: A 2-D DYNAMIC ULTRASOUND IMAGING STUDY OF MILDLY STRESS INCONTINENT PAROUS WOMEN.

Hypothesis/aims of the study

It is believed that optimal positioning of urethrovesical structures is a contributing component for urinary continence. Pelvic floor muscle contraction and training is known to influence position of the bladder neck during voluntary contraction as well as at rest after a period of intensive pelvic floor muscle training. This change in positioning has been found to correlate with significantly reduced urinary loss [1]. It is therefore probable that one of the aims of pelvic floor muscle strength training for stress urinary incontinence should be to alter position of urethrovesical structures. Within this paradigm it would be important that position of urethrovesical structures would be optimised by each pelvic floor muscle contraction. It is possible that certain cues to instruction for a pelvic floor muscle contraction do not achieve this aim. There is currently no standardised instruction for a pelvic floor muscle contraction, and cues to instruction vary widely in the specialist and lay literature. Differing cues to instruction may variously facilitate selective contraction of the pelvic floor muscles resulting in sub-optimal dynamic urethrovesical positioning. We have previously reported our findings from an observational pilot study that investigated cues to instruction in a cohort of nulliparous continent women using 2-D dynamic ultrasound imaging of the urethra. Inclusion of a cue to instruction that facilitates selective contraction of the posterior component of the pelvic floor muscle was found to be significantly more influential on urethral position than an anterior cue [2]. The aim of the current study was to investigate the effect of different cues to instruction on urethral position in a cohort of parous women with mild stress urinary incontinence, in order to reach preliminary conclusions about the usefulness of future standardisation of pelvic floor muscle instruction with respect to clinical outcomes, comparability of research studies and instructions for the non-clinical population. We hypothesized that a cue to instruction that primarily facilitates posterior recruitment of the pelvic floor muscle would be more influential in effecting change in position of the urethra than a cue to instruction that would primarily facilitate anterior recruitment, in parous women with mild stress urinary incontinence.

Study design, materials and methods

Twenty-two parous women with mild previously unreported stress urinary incontinence who had been delivered vaginally volunteered and gave informed consent to this quasi-experimental study (mean age 51[range=39-63]; mean BMI 25 [range 21-31]). Urinary loss was demonstrated in each subject with a full bladder stress test. 2-D dynamic perineal ultrasound imaging confirmed ability to perform a voluntary pelvic floor muscle contraction correctly. One subject was excluded at this stage as she was unable to perform a voluntary contraction correctly**.** Twenty-one subjects were taught selective contraction of the pelvic floor muscle using three different cues to instruction in order to facilitate anterior, posterior or anterior and posterior combined recruitment of the pelvic floor muscle. EMG studies indicated selective activation. 2-D dynamic perineal ultrasound images of three pelvic floor muscle contractions for each cue were captured in supine. The angle of urethral inclination was chosen as the measurement index. Whilst position of the bladder neck has been studied more extensively, pre-pilot work found the angle of urethral inclination more suitable for the purpose of measuring the very small differences in urethral position. The angle of urethral inclination has been found to significantly correlate with bladder neck parameters [3]. Reliability studies of the methodology used have been reported by us previously and found to be robust [2]. Images were read blinded by one reader. Mean for each instruction was analysed using ANOVA with post hoc Bonferroni analysis.

Results

Mean difference in angle of urethral inclination was greater using a posterior cue to instruction compared to anterior cue by 3.93˚ [95%CI:-7.008 to -0.863 *p*=0.008] and combined cue compared to anterior by 4.94˚ [95%CI:-8.018 to -1.873 *p*=0.001.

Interpretation of results

We have demonstrated that in this cohort of mildly incontinent parous women, selective contraction of the pelvic floor muscles is possible and that selective contraction variously influences urethral position. The average difference of 4˚ and 5˚ in favour of the posterior and combined cue to instruction respectively as compared to an anterior cue suggests that the anterior cue to instruction alone has less effect on the position of the urethra than the posterior or combined cues. We propose that the anterior cue to instruction alone principally facilitates recruitment of the pubovisceral muscle with probable suboptimal facilitation of recruitment of the puborectalis muscle. It is likely that the posterior cue to instruction principally facilitates recruitment of the puborectalis muscle. The combined cue to instruction is likely to facilitate global contraction. Importantly, it is the posterior cue to instruction that is common to both posterior and combined cues to instruction.

The results presented here suggest that posterior recruitment of the pelvic floor that is likely to facilitate puborectalis muscle is more important in dynamic urethral positioning than has been previously considered. The puborectalis muscle is acknowledged far less in the literature as having a role in urinary incontinence than the pubovisceral muscle. This is probably due to its intimate loop arrangement around the rectum and its known function in faecal continence. Historically with respect to the literature a posterior cue has not always been included in instructions for a pelvic floor muscle contraction. Currently, non-specialist health care professionals, fitness teachers and women in the non-clinical population often teach selective voluntarily contraction around the urethra, not only because it is likely to be intuitive to contract anterially around the area from which urine leaks, but also because this cue continues to appear commonly in the lay and media publications. Further, cues to instruction in research studies currently vary thus rendering comparison of outcomes between studies problematic.

Concluding message

The results from this study of parous women with mild stress urinary incontinence concur with results from our previous study of continent nulliparous women [2] in finding that angle of urethral inclination is optimised when a pelvic floor muscle instruction includes a posterior cue that is likely to facilitate recruitment of the puborectalis. Our preliminary conclusions are that a standardised instruction for pelvic floor muscle contraction may be useful and that randomised controlled trials are now required to investigate the clinical implications of selective cues to instruction for a pelvic floor muscle contraction. These may lead to a standardised instruction that may improve clinical outcomes, render comparison of PFM research studies more meaningful, and de-mystify instruction of a pelvic floor muscle contraction for non-specialists.

References

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Was this study approved by an ethics committee?	**Yes**
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Was the Declaration of Helsinki followed?	**Yes**
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