

DIFFERENCES IN ACTIVATION OF THE PELVIC FLOOR MUSCLES BETWEEN MEN WITH AND WITHOUT URINARY INCONTINENCE AFTER PROSTATE SURGERY REVEALED BY TRANSPERINEAL ULTRASOUND IMAGING

Hypothesis / aims of study

Up to 60% of men experience urinary incontinence after radical prostatectomy. Depending on the method used to define "continence", many men continue to experience symptoms beyond 12 months and for some this has a major impact on quality of life. It is plausible that poor control of the pelvic floor muscles may contribute to incontinence, yet recent systematic reviews have questioned the success of pelvic floor muscle training in rehabilitation of post-prostatectomy incontinence. Maintenance of continence is complex and requires integrated function of multiple muscles that have the capacity to influence the pressure in the urethra. A major gap in the field has been lack of methods to study the function of these muscles in men. Recent development and validation of transperineal ultrasound imaging methods provides an opportunity to study the multiple pelvic floor muscles in a range of tasks. Motion of the urethra, urethrovesical junction/anorectal angle and bulb of penis have been shown to provide indication of activation of the striated urethral sphincter, puborectalis and bulbocavernosus muscles, respectively. This study aimed to use this new methodology to study the pelvic floor muscles in men with and without persistent symptoms of urinary incontinence after radical prostatectomy.

Study design, materials and methods

Twenty-five men aged 48-75 years participated in the study and were between 2-210 months (average 54 months) post surgery. All completed the ICS male short form questionnaire. Those who scored greater than or equal to 5 in the incontinence symptoms were considered "incontinent". In supported sitting, the ultrasound transducer (8 MHz) was placed on the perineum in a sagittal alignment with the image optimised to view the urethra, bulb of penis, bladder, ano-rectal angle and bladder. Images were recorded in video format during: (i) voluntary contraction; and (ii) evoked cough induced by inhalation of capsaicin at a dose titrated to evoke 2 coughs. Measures were compared between groups with t-tests, and correlations were assessed with Pearson's correlation coefficient. The study was approved by the Institutional Medical Research Ethics Committee.

Results

Men with persistent symptoms of urinary incontinence after radical prostatectomy had several features of pelvic floor muscle function that differed from their continent counterparts. During coughing, continent men achieved greater dorsal displacement of the mid-urethra, which indicates greater activation of the striated urethral sphincter (5.8[2.0] vs. 3.9[1.2] mm, $p=0.01$), and less net depression of the urethrovesical junction, which indicates better ability of the puborectalis muscle to support the bladder against elevated intra-abdominal pressure ($P=0.01$). Severity of incontinence (ICS SF incontinence component) was correlated with net urethrovesical junction displacement ($R=0.54$) and mid-dorsal motion ($R=0.52$). During voluntary contraction of the pelvic floor muscles, continent men achieved greater dorsal motion of the mid-urethra (6.2[2.2] vs. 3.9[1.6], $p=0.01$) and greater elevation of the urethrovesical junction (3.6[1.9] vs. -1.1[4.4], $p=0.007$). Severity of incontinence was correlated with net urethrovesical junction displacement ($R=0.56$) and mid-dorsal motion ($R=0.42$).

Interpretation of results

The results of this study show that several features indicative of poor control of the pelvic floor muscles are related to persistent incontinence after radical prostatectomy. During both coughing and voluntary contraction of the pelvic floor muscles, men with persistent incontinence had less activation of the striated urethral sphincter and greater depression of the urethrovesical junction. Both of these features would infer lesser capacity to maintain sufficient urethral pressure to prevent urine loss from the bladder. There was considerable variation between individuals and not all features of poor control were observed in all men. This implies interventions that target training of pelvic floor muscles to treat incontinence may need to be individualised to match the patient presentation. Recent work has shown that different patterns of activation can be achieved with different instructions, which may aid targeting of treatment.

Concluding message

This is the first study to identify differences in multiple components of pelvic floor muscle function in men with persistent symptoms of urinary incontinence after radical prostatectomy and provides potential targets for treatment.

Disclosures

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